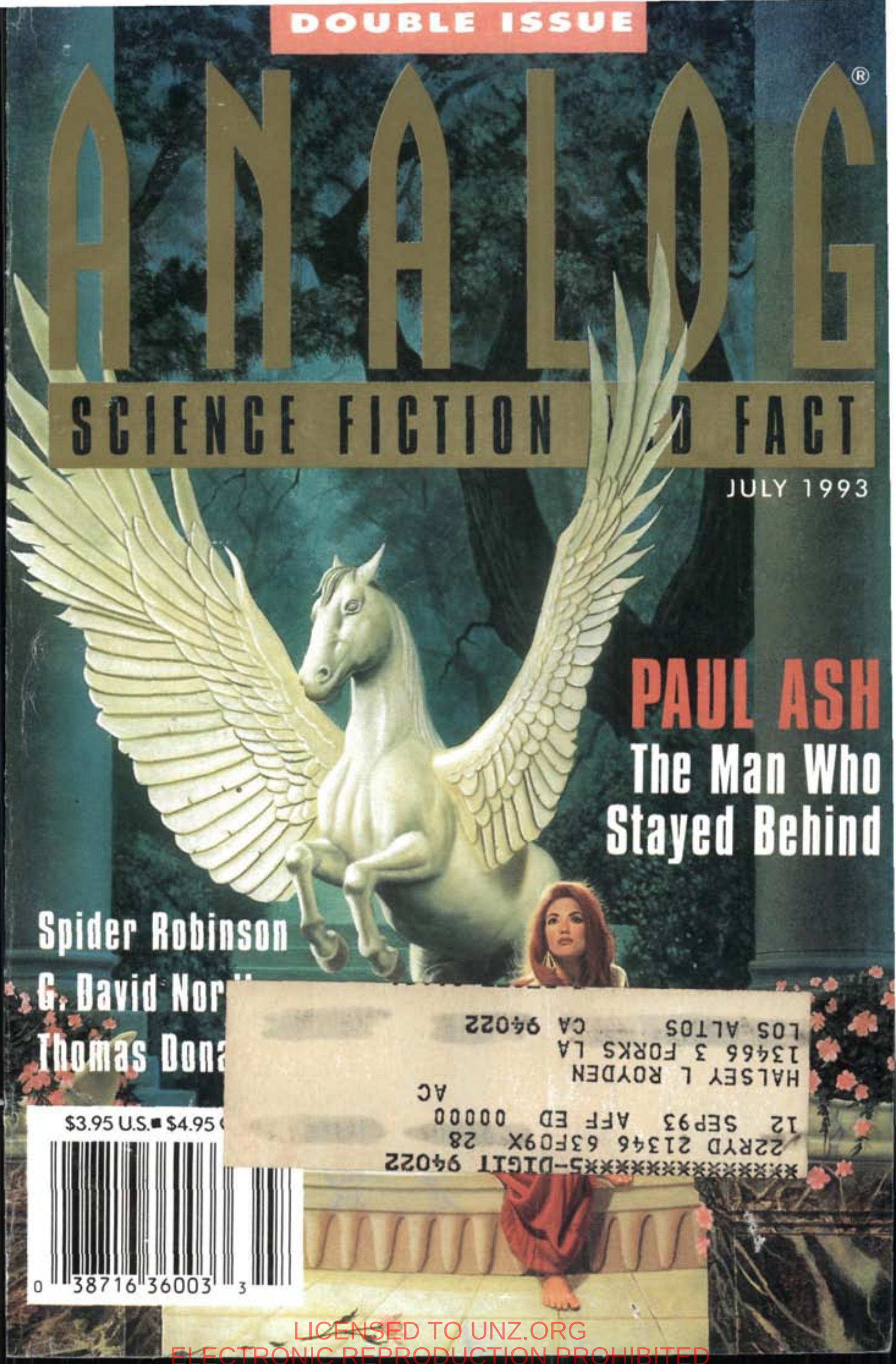

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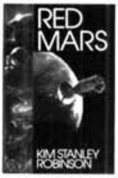
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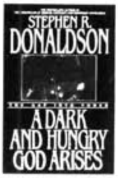
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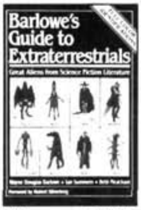
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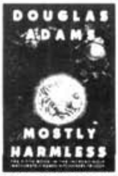
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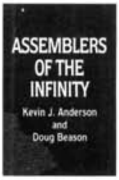
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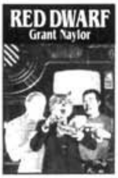
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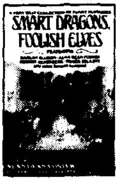
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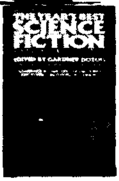
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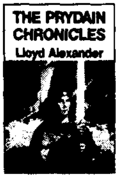
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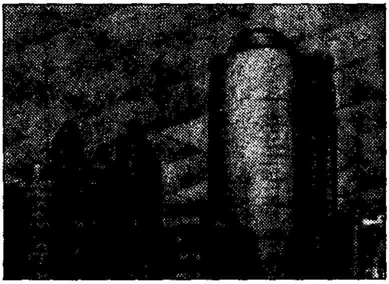

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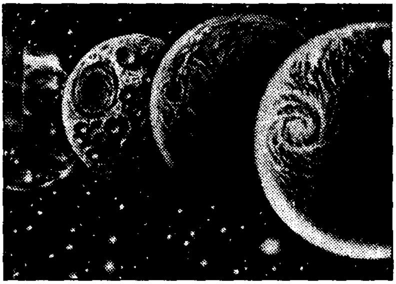

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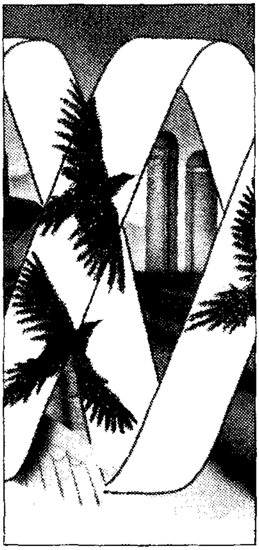
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Stanley Schmidt

REALLY FOREIGN LANGUAGES

A while back an author and I had a discussion about what to call a character of Polish ancestry who lived a couple of hundred years in our future. His name, as I first saw it, would have been instantly recognizable to a contemporary Pole as non-Polish. It not only used letters in non-Polish ways, but used letters that present-day Polish doesn't use at all. On the other hand, a contemporary non-Pole might be unsure how to pronounce a correctly spelled Polish name, since Polish tends to look unpronounceable to those not familiar with its rules. (Which, by the way, are actually far more consistent and logical than those of English!) Surely in a couple of centuries there could be orthographic reforms, and those could be used to justify writing the name in a way that more contemporary readers would find easy to pronounce.

But was that really necessary? Science fiction readers, after all, are quite accustomed to looking at unfamiliar names and inventing their own working pronunciations for the duration of a story. It doesn't matter whether it's the pronunciation the character would actually use. The reader just needs something to call the character, and ideally that something should convey at least a hint of his or her origins.

True, some readers get annoyed with writers who give characters "unpronounceable" names like "Bdwdlsplg"; but others are put off by the obvious artificiality of giving aliens humanly "easy" names like "Saratak." In the end, if you're writing a story about aliens, or even future humans, you have to make your own decision about how to deal with this dilemma. In accordance with Schmidt's First Empirical Law of Editing, whatever you decide will be wrong according to somebody; so it doesn't pay to worry too hard about getting it "right."

On the other hand, it can be fun to speculate on what kinds of forms real alien languages might take. Are their words likely to look more like "Saratak" or "Bdwdlsplg"? Is even "Bdwdlsplg" improbably close to human norms? Is the word "word" even likely to apply?

Most humans have little conception of the extent of variation among existing human languages. Language department chairfolk who fear for their departments' survival at curriculum reform time speak eloquently of the "broadening" influence of language study; but more often than not they actually offer a mere handful of languages such as Spanish, French, and German, all too closely related to English to be very broadening. I've sometimes annoyed colleagues in such debates by suggesting that since the broadening factor *is* so important, students should all be exposed to at least one *non-Indo-European* language.

I was not being facetious. From my own experience, I can remember when I had studied English, Spanish, and German, and was more conscious of their differences than of their similarities. Then I took up Swahili; and in a very short time, English, Spanish, and German began looking like mere dialects.

Much of the reason for that lay in the different ways Bantu and Indo-European languages organize thoughts, and I'll say more about that later. First, though, we were talking about spelling and pronunciation. Every human language uses some subset of the sounds that can be made by human vocal systems, and does not use many others. English speakers tend to have a bit of trouble with the umlaut sounds in German and French, and even more with the more complicated sets of them in Scandinavian languages. Amerindian languages have lots of consonants so different from ours that they're *very* difficult for adult Anglos to learn. Lest you think that the problem is one-way—that English has all the simple, "reasonable" sounds and everybody else invents unnecessary difficulties—I should point out that English is chock-full of sounds that are so complex and/or uncommon in

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other languages that almost everybody else finds them troublesome. Examples include the voiced and unvoiced *th* and many English vowels.

But that's just the beginning. In most of these cases we're talking about things that an English speaker would have no trouble recognizing as vowels or consonants, even if he had trouble duplicating them. Several southern African languages use "clicks" that are so utterly different from any of our sounds that English speakers have trouble even hearing them as speech. If you'd like a demonstration, rent the videotape of *The Gods Must Be Crazy*. Chances are very good that when you hear a Bushman speaking, your ear will interpret it as someone speaking a "normal" clickless language, with an unidentified separate source making clicking noises in the background.

In many African and Oriental languages, the tone in which a word is pronounced is integral to its identity and drastically affects its meaning. "Oh," you may think, "English does that, too. I can say 'Come on!' in tones that express encouragement, urgency, or incredulity." But that's not what I mean. I'm talking about a *single word* being pronounced in four tones—e.g., high level, low level, rising, and falling—that make it four completely unrelated words, with meanings as different as "spinach," "carburetor," "politician," and "entropy."

All of these variations, bizarre as they may seem to someone familiar with only one language, are custom-

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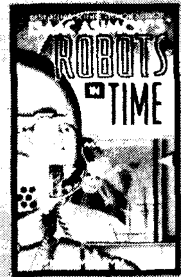

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Now, what are the chances that a being independently evolved on another world will have a vocal system so nearly identical to ours that it will naturally speak with sounds even as close to English as Arabic or Chinese? Pretty slim, I'd guess. If you want to imagine what kind of speeches you might hear in an Interstellar Union meeting, you should probably be looking not only beyond French to Inuit, but beyond Inuit to the sounds of things like woodcocks and loons, whales and nightingales, siamangs and oropendolas.

At least.

Ever look at a field guide to birds? A typical one will try to describe a bird call with some rather fanciful transcription like "Good Sam Peabody" or "Whee-wheeoo-titi-whee." (I'm not making these up!) If you hear the actual bird, you may be able to recognize enough similarity in general rhythm and intonation to make the transcription somewhat useful as a mnemonic. But the vowels and consonants aren't even vaguely there, and the transcription is unlikely to give you enough idea of what the real thing sounds like to enable you to recognize it when you hear it.

Birds and cetaceans simply don't have the same kind of vocal equipment humans do. Therefore the sounds they make are simply too different to be mutually pronounceable, or for theirs to be represented with *any* accuracy by our spelling systems. The situation with beings evolved independently on other worlds is more likely to be like that than like humans who simply grew up in different cultures. So yes, Virginia, "Bdwdlsplg" probably *is* too human-pronounceable to be very realistic, at least very often.

All this assumes that our aliens even use sound as their medium of information exchange. We know other forms of communication are not only possible, but used right here on Earth. Bees "dance" to direct their coworkers to food supplies. Many animals use chemicals called pheromones to convey such messages as, "I'm ready to mate." Those messages are pretty simple, though, and the methods may be limited in applicability by the nature of the media. Smells, for example, tend to be too sloppy in both spatial and temporal resolution to lend themselves to holding esoteric discussions like this one. (Or are they? I'm open to considering a story from any writer who understands the apparent problem and can figure out a workable way around it!)

Some beings could use modulated light, but that has a line-of-sight limitation. Sound seems likely to be a favored compromise for many environments, at least ones at all similar to those found on Earth. It lends itself to a fair degree of precision and speed under a wide range of conditions. So in one form or another, I'd guess that many of the universe's beings do speak with sound.

But not necessarily with words or sentences as we know them. Just as human phonetic systems vary more than the inhabitants of any one cul-

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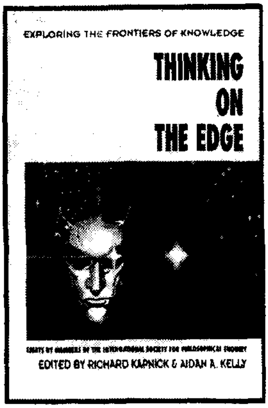

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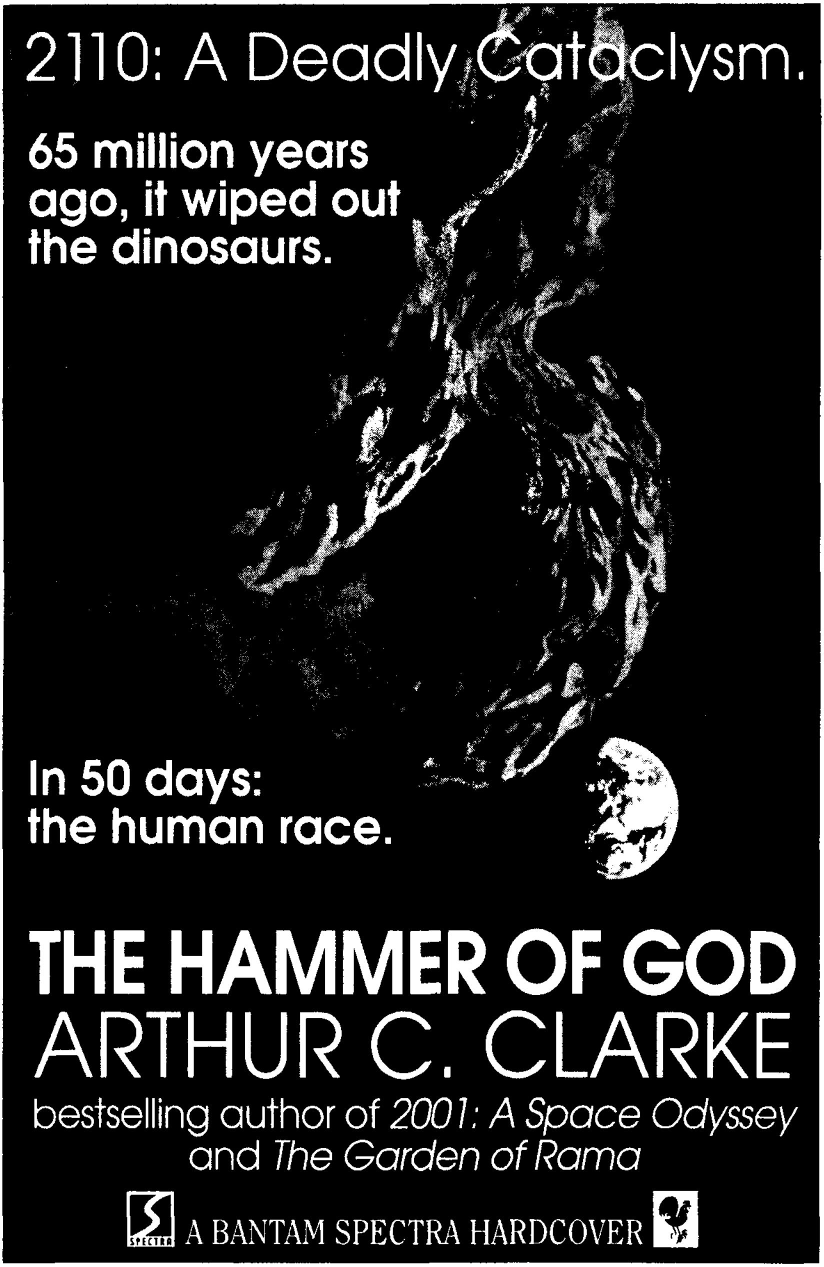
ture commonly realize, and alien ones are likely to vary far more than that, so it is with grammatical structures—the patterns in which ideas are organized. I first began to grasp this, as hinted above, when I started studying Swahili. Swahili pronunciation is actually unusually easy for an English speaker to learn, and the grammar is pretty easy, too—once you get past the initial shock. It's easy because it's very logical and regular, providing living proof that a real language doesn't have to be burdened down with all the exceptions that a French or German student must memorize. But there *is* an initial shock, because it arranges things in a way completely new to an Indo-European speaker.

In English or Spanish or German, the basic unit is the word, which may be a verb or a noun or any of several other types. Some of these words undergo changes to express things like verb tense (e.g., present or past) or noun case (e.g., subject or object of a verb). Usually these changes occur at the end of a word (e.g. "change" changes to "changed"), so that you can look in a dictionary for something resembling the front end of an unfamiliar word and thereby learn what it means. (Though sometimes, perversely, the whole word changes unpredictably, as from "go" to "went.")

In Swahili, whose structure is of a type called "agglutinative," the word is not quite so basic. Much of the grammar that must be learned is rules for *building* words by assembling smaller elements. Most of the elements that are added on to "foundation" blocks such as verb stems are added at the *front*, not the back. This makes using a dictionary without a good basic knowledge of grammar a bit harder, because the part you look up may be close to the end. The uplookable root of "kilichotutosha," for example, is "tosha," and you have to know what the prefixes "ki," "li," "cho," and "tu" mean when attached to it in that order. This may sound frightening when you first hear of it, but it actually makes life easier when you get used to it. An introductory Swahili book, unlike one in French or Spanish, may introduce three or four verb tenses in the first lesson, and then never bother you with an exception.

That's just one example of how differently languages can be constructed. Since that one, like English, is designed for the kind of nervous system peculiar to humans, we can easily expect that beings evolved in very different environments might use structures far more different than that. To find a sufficiently different environment, you needn't even look to another planet. Earthly dolphins live in a water world that is effectively far more three-dimensional than ours. They use a much wider frequency range of sound than we do, and they use it in more ways. They apparently use it for communication, but also as sonar, for navigating and locating food. They can produce "stereophonic" sound, and their bodies are largely transparent to many of the sounds that they use.

Some years ago I had occasion to research this because I was writing a



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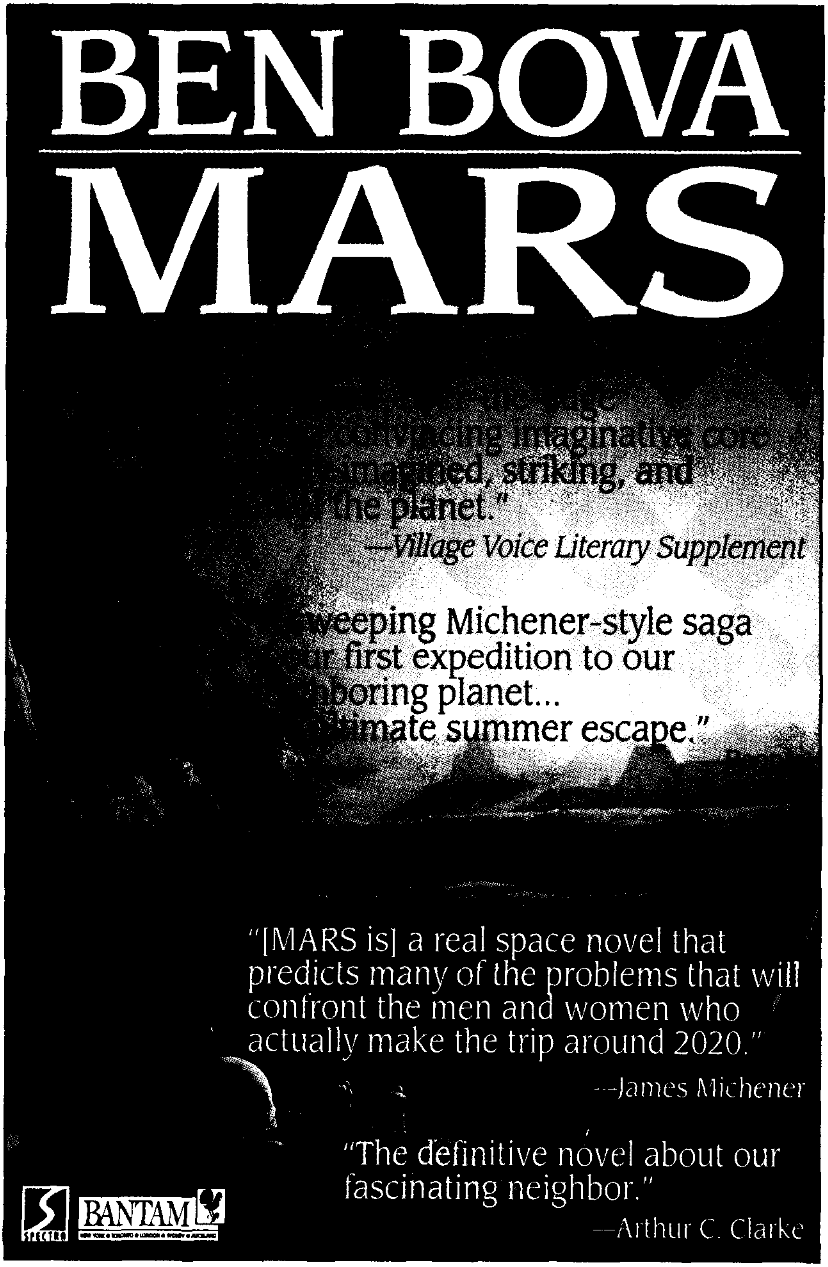
story ("Pinocchio," *Analog*, September 1977) with a dolphin as a major character. At that time some researchers suspected that dolphin intelligence was comparable to human, so I accepted that working hypothesis and tried to imagine what my intelligent dolphins' language and culture might be like, using the research findings available at that time. Among other things, since their means of communication and perception were so closely linked, my dolphins found the human concept of "word" odd and difficult to grasp. "Our language," Pinocchio explains to a human contact, "grew out of descriptions, and our descriptions are much more graphic than yours. You might say we talk in pictures. . . . [For example] instead of saying 'A fish just swam by above and to my right,' I'd say 'I made such-and-such kind of feeling noises, and this is what I heard.' Another dolphin, when I repeated my echoes, would literally see that fish—what kind it was, how big it was, where it was, how fast it was going, and what was around it."

More recent researchers have tended to be less optimistic about dolphins having that kind of intelligence; but even if it didn't develop here, it could somewhere else. My hope in mentioning it is that it will encourage writers to think about how much real languages might vary, and to weave those speculations deftly into their stories. Languages are an integral and fascinating part of the cultures that speak them, and the universe likely contains many that are far more fascinating than science fiction writers often suggest.

Aliens named "Smith" may make life easier for lazy readers; but they're almost certainly not only unlikely, but far less interesting than the real thing. And our readers, generally speaking, are not lazy! ■

History is too serious to be left to historians.

Iain Macleod



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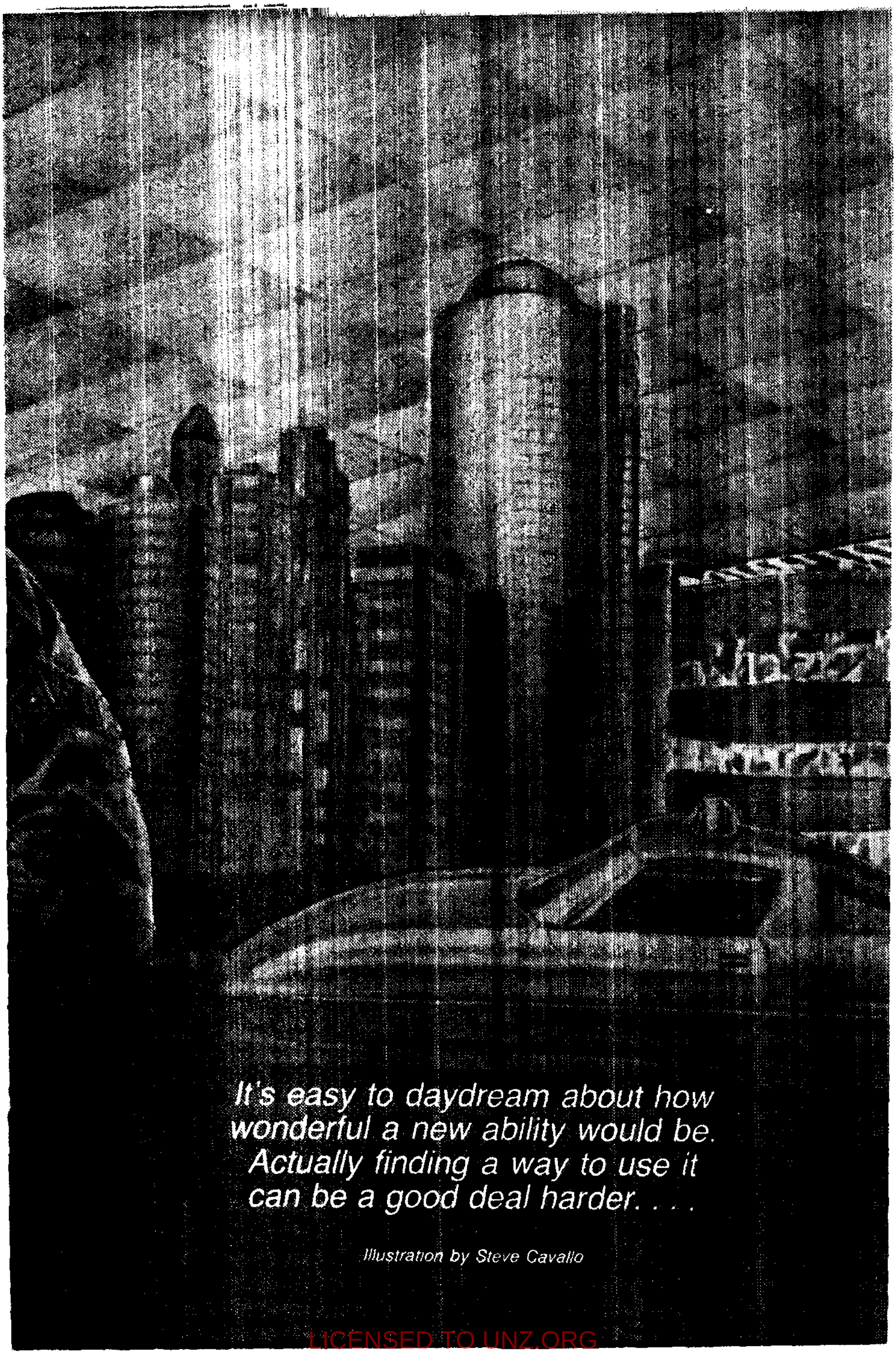

It's easy to daydream about how wonderful a new ability would be. Actually finding a way to use it can be a good deal harder. . . .

Illustration by Steve Cavallo

PROLOGUE

"The planet was life-bearing before it was terraformed," said Dr. Woodman firmly. "Don't try to tell me the Generation Ship could have established terrestrial plants and animals in three centuries if there hadn't been an oxygen atmosphere at the very least. And the only way to maintain free oxygen is by photosynthesis."

"I know that, Si," retorted Richard Jordan. "I'm just saying that the terraforming organisms must have taken over completely. The first survey team didn't find anything at all that wasn't descended from a species on Earth."

The terraforming was obvious, John Jordan thought, even from orbit. The TV screen in front of him was currently showing the view from *Kepler's* belly-scope; several hundred square kilometers of landscape, and over most of it the varied but unmistakable greens of terrestrial plants. So far five other planets had been discovered on which photosynthesis had evolved, but each had its own chemicals for imprisoning light. Only Earth's biota depended on chlorophyll.

"I'm not denying that terrestrial plants have taken over the main habitats," said Woodman. "But the first survey team didn't explore the islands—there are whole chains a thousand kilometers or more from the mainland—or the polar regions. They weren't equipped to explore the seabed more than a few meters down. I'll bet some of the native organisms have hung on there, if there aren't any on the surface."

All of which might be true, the elder Jordan thought, but if Silas Woodman thought he was going to get a chance to investigate the sea depths during the next two years he had completely misunderstood the purpose of this second survey of Planet C. Which would not be like him, at all.

Superimposed on the picture landscape were three rice-grain-sized blips showing the current positions of *Kepler, Galileo,* and *Flammarion.* How often did it happen, Jordan wondered, that there were three Space Force ships in orbit around any planet other than Earth? Come to that, how often did it happen there?

Galileo, carrying fifteen members of the Planet C survey team, had come straight here from Earth. She had also carried the engineers and other specialists who were currently down on the surface finishing the assembly of the Mass-Time Projector; and of the TV transmitter which, it was intended, would shortly begin beaming up pictures (flat) of its operation. *Kepler* and *Flammarion* had both been diverted from their courses to get here; *Flammarion* from a journey starting at Eta Carinae and due to end at a gas-giant orbiting an unnamed star, and *Kepler* from returning to Earth with the Third Lambdan Expedition on board.

Twelve of the scientists on *Flammarion* were due to join the survey team; but *Kepler* had been diverted, presumably, just in order to provide additional witnesses for this final test of the Mass-Time Projector. True, after the orders for the diversion had emerged from *Kepler's* computer, it had gone on to print, and seal, a letter to each of the scientists on board. It contained a pressing invitation to take part in the survey on Planet C; but he doubted very much whether any of them had been expected to accept. They were all specialists in alien life-forms. Planet C's biota, according to the letters, was completely derived from terrestrial forms, mostly cultivated at that.

So why had Silas Woodman, xenobotanist, volunteered to join?

The objective was not scientific investigation, or even to study the techniques used by the terraformers. It was to check the suitability of the planet for colonization.

Once Planet C's existence became generally known, several million people were going to demand to be taken there. For the last five years the Space Force had been sitting on the information, trying to come up with methods of selecting suitable colonists and of transporting them in large enough numbers, before the rush began.

No wonder that Space Force wanted as many witnesses as possible to the efficiency, and even more to the safety, of the Mass-Time Projector. If that really worked as advertised—and it must have been checked scores of times already—the second and more difficult part of the problem would be well on the way to a solution.

However, the fact that Silas Woodman was due to reach Planet C, not in a shuttle but in one of the steel boxes which all on board had been requested *not* to refer to as coffins, made it even more difficult to understand—

On the screen the panorama of the landscape was suddenly replaced by a view of human rumps grouped around an assemblage of girders, with a square tunnel running through the center.

"Oh-ho," said Woodman softly. "They've got the TV transmitter working, at all events. Now they just need to get the Projector together and I can climb into my coff—my Container, life-supporting, personnel, for the transportation of—and be off."

There was a momentary silence. Just as it was becoming uncomfortable, Richard Jordan spoke.

"They're quite comfortable," he said seriously. "Padding. And they don't get stuffy or sweaty. You can feel the air conditioning all the time—not a draft, exactly, just a sort of whispering round your skin."

Woodman blinked. "Good God. Yesterday when they tested me for claustrophobia I was crammed into an inadequate cupboard for half an hour. Do you mean there was one of the coffins—I mean Containers, life-supporting, etcetera—on board all the time?"

"I don't think so. Just the ones on *Galileo* and Planet C. I tried one on Earth, two years ago."

"How did you manage that? None of us had even heard of the Projector, then."

"Hal showed it to me."

Jordan spoke with careful control. "Who is Hal, Rick?"

"I *did* tell you about him, Doc. I met him that time you had a conference at the Space Gate. He was there, too."

Jordan remembered the occasion. Publicity over The Boy Who Went To Space was at the height of its fever. Richard's mother, then on her fifth husband (or was it the sixth?) had suddenly made a bid for custody. Ellen, his second wife, had just given birth to a daughter and was still in the hospital. The Space Gate was closed to reporters except at official press conferences; it had seemed safest to take Richard with him. He said "Sorry. I seem to have forgotten Hal. Did we meet?"

"Well, you *saw* him, but you didn't speak. He was sort of mooning around while everyone else was at the conference."

"But he had access to the coffins?"

"Yes. The guards had orders not to interfere. He was the person who thought of the coffins, you see. Well, he did the math—"

"Ricky," said Woodman, "are you talking about this extraordinary young man who developed the second-quantum Equations of Mass-Time?"

"That's right. Hal thinks in math all the time. He can't talk very well, so he mostly doesn't try."

"He can't?" said Jordan blankly. But that would explain some of the mystery surrounding the youthful genius, and why he, unlike most of the other scientists voyaging in *Galileo,* had not done a stint on inter-ship tri-V.

"Now hear this," said the General Communicator loudly. "Transportation to *Galileo* for all persons due to descend to the planet's surface is now waiting at Lock 3. Will the following please report there immediately—"

Without waiting for his name to be called, Woodman got to his feet.

"Well, folks, this is it. See you in a couple of years. Tell Ellen goodbye for me and say I'll bring her a creeping-apple for a souvenir. . . ."

Oh, damn, Jordan thought. He would miss Woodman—not only a first-class scientist but a consistently helpful colleague; but Richard would miss him a great deal more. From the time Jordan had first hauled him along on an interplanetary expedition at the age of twelve, Woodman had taken a friendly interest in the boy. Nine months ago, when Richard's best friend had died—not an easy thing to face at sixteen—he had retreated into a silent unresponsive misery lasting for half a year. It was Woodman who had done the most to lead him out of it.

However, Richard was showing no sign of distress at the moment.

"They're getting ready to put the box into the Projector," he said.

On the screen, a long metal oblong was being raised on a forklift towards the opening among the girders. "Why are they doing that on the planet?" inquired Jordan, confused. "I thought the first transmissions were to be from *Galileo.*"

"Yes, but there has to be a box in *both* Projectors. They get exchanged."

"I see," said his father, rather blankly. "And—"

"The first one's coming down!"

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A red telltale was alight on the side of the machine. Three seconds later it went green. With some difficulty the forklift was inserted under the box in the Projector—now, presumably, a different box—and it was eased out of the space and lowered to the ground.

The waiting men fell on it, obscuring events; but after a couple of minutes a small dark-skinned man stood apart in the middle of the mob. Those who could not get at his hand to shake it were shaking their own above their heads.

Later arrivals were greeted with less excitement. In fact the whole process became routine. Many of the watchers in *Kepler's* lounge wandered off. It was more than three hours before Silas Woodman stepped out of the box, made a face at the camera, and walked out of view.

Two hours after the last scientist had emerged from the receiver it was announced that reverse transmissions would begin; the engineers who had erected the installation on the planet were to be returned to *Galileo*. Jordan had spent some time in his cabin with his wife and his small daughter, who was upset by the general bustle and refused to be left alone, returned to find Richard still gazing at the screen.

"What's happening now?"

"They've just got the first man into the Projector."

The lifter moved out of the way. Inside the womb of the metal block there was the faintest of flickers—it could have been a transmission fault; but the camera switched to the glowing telltale. Two minutes later it was announced from *Galileo* that the first of the engineers had made a safe return.

Richard got up and stretched. "I suppose I might as well go. . . ." he said, and sat down again.

"Hypnotic," said his father sympathetically. "But they'll go on for hours at this rate. Loading and unloading will have to be speeded up somehow before they start putting colonists through."

A man climbed into the coffin and lay down. The lid was clamped in place. Once more the lifter shuffled its plate under the unwieldy object, heaved it up, and slid it into the black tunnel among the girders of the frame. The camera changed to a view of the telltale and of somebody's hand pressing the adjacent switch.

The screen went black.

"Camera breakdown," said Jordan. "I'm surprised it didn't happen sooner."

Richard said in a strained voice, "The screen would be grey."

"Damn it," yelled the radio, "switch to the telescope, can't you?"

The screen flickered momentarily, but remained black.

"Must be the circuits shipside," muttered Jordan.

Richard said harshly, "Isn't that a star?"

Jordan stared at the white fleck. There were a few others, in a triangular area down in one corner of the screen. A triangle? The inner edge seemed to have a curve to it. . . .

There was a rising tumult of voices. A master-switch seemed to have been opened, connecting in half the communicators on the ship. A voice he recognized—that of the navigator, but strained far above its normal register—cut in suddenly; "I tell you I was looking straight at it! The screen of the naviscope. I was looking at it when the thing happened. It showed the planet. Then he pressed the goddamn switch and it went black. I've tried every instrument we have. They *all* show black, except where they show stars. I tell you the bloody planet's disappeared!"

PART ONE

The striped expanse of the roadway, shining under the downwardly-directed lights, turned to a flat grey, the pattern of the levstrips fading into the background. Walls became visible in an apparently endless perspective a hundred meters high; variegated at street level by doorways and shop windows, and ahead of the floater by a series of lacelike metal bridges that crossed between the walls at varying heights. The roof, source of most of the new light, was more or less invisible behind the glow.

On the right of the floater, trees, shrubs, and flowerbeds were revealed, sliding by between stretches of grass. The central divide of the roadway, an ornamental park sixty meters wide, stretched seemingly unbroken to the end of sight. (In fact a succession of street crossings divided it into ten sections, each about a kilometer long; but from the low-slung floater these were not in sight.)

Sebastian Karel suppressed a sigh of relief. Lights-up meant that the Dawn Patrol, so-called, had only half an hour to go. Ryder, his current partner, had been a patrolman with Precinct II/East for nineteen years; Karel, aged twenty-three, had been simultaneously transferred and promoted, nine days ago. It was a situation with many possibilities for awkwardness, and Ryder had made the most of them. . . .

"Hot-spot ahead, Sergeant. Fifty yards and closing . . . forty. . . ."

Karel slid in to the curb and stopped the floater, according to the detector, exactly twenty meters behind the position of the "hot-spot."

Ryder, predictably, complained.

"Cry sakes, this ain't Fourth Level. Twenty to one it's just a kid sleeping out after a family row. I walked far enough tonight already."

Karel glanced again at the instrument board. The point of light that indicated the presence of a warm human body was only a few meters from the roadway. Would-be sleepers usually made for the mid-line, as far away from the lights and traffic as they could get.

The first explanation that occurred to him was profoundly unwelcome. He stared at the indicator. *Life, death . . . the most fundamental difference there is, it just has to show somehow.*

Ryder uttered an impatient cough. Karel switched off and pocketed the key. Must have been a glitch in his brain; there was no way to tell the infrared signature of a live body from that of one which had not had time to get cold. . . .

Ryder was putting on a show of exaggerated caution, pussyfooting up to trees and peering from behind the trunks. Statistically speaking the patrolman had been right—on Second Level, trouble was unlikely. That still made him a clown. Unlikely was not the same as impossible; patrols had met with surprises before now. . . . Mentally, Karel shook himself. For some reason this particular hotspot had given him a bad feeling; but the probability was high that he and Ryder were going to wake up someone who for one reason or another simply had not cared to sleep at home. A night on the central reservation was no great hardship; the temperature was constant at 70°, it was dark between 2000 and 0600, and since the grass was irrigated from below, the surface was dry and the ground soft.

If spaceheads had any sense they would doss here, instead of shelling out for dirty bedding in a crowded flop. They'd be safer, too. Even on Four the surveillance cameras in the Avenues were in good order, whatever happened in some of the side streets.

Maybe they thought it would be like camping out topside. Karel had tried that, once; he had vivid memories of cold, damp, disorganization, and finding fifty-seven mosquito bites when he got back to a proper bath at home—

The sound that came from Ryder was a kind of squealing gasp. It was followed by a yell of *"Sarge!"*

Karel's stunner was already in his hand. He had only a few meters to run.

He found Ryder on the far side of a tree trunk, crouched beside a sprawled figure. When the patrolman turned it over, Karel was looking at a famine victim. Teeth prominent under fleshless lips, stick-like ankles and wrists protruding from a filthy coverall. Matted hair, chopped short. Chest flat; but no sign of a beard.

"She's got a pulse," Ryder said.

Karel nodded. "I'll call in. You look for the rest."

Ryder blinked at him, then started to swear; a string of obscenities interspersed with the word "crimps." He straightened and strode towards the floater.

Karel checked the girl's breathing and the pulse in her neck. Stars, she looked terrible. Crimps usually dumped their victims on Fourth Level; but Karel had been shown videos during training, and he couldn't remember that any of them looked as starved, as exhausted, as *drained* as this. He lifted one of the limp hands. There were callouses on every finger, and a number of small scars; here and there speckles of something dark had been driven under the skin.

Returning to the curb, he located a patch with a smoother texture than the rest, got out his phone and ran the wire-thin probe over the side of the stone. When the tiny bulb in the head lit up he loosened his grasp; the probe twitched in his fingers, found the pin-hole and was sucked in.

A voice in Karel's ear said, "Precinct II/West."

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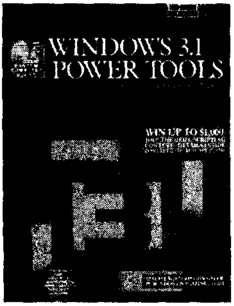

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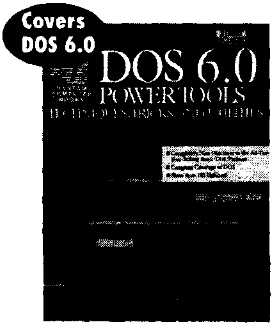

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"Karel here. Urgent. First, put a hold on records from Sixth Avenue between Twenty and Thirty."

Thirty seconds' pause. "Done."

"Second—"

"Let me guess," said the phone wearily. "Some crimp's parked another batch of returned empties there."

"There've been others?" said Karel sharply.

"All over. One group on First, one in Two/North, three on Third. Fourth have found six so far. Five in every batch, so go on looking."

"You mean there've been *sixty* this morning?"

"So far. Most of the patrols are in—"

"*Sixty?*"

"*So far.* When you've found your five, take them to the med center on Sixty-fourth Street; Twenty-third are busy with the first batch. Then report back. Oh, better let your mother know you'll be late home."

Of all the rotten things that had crawled into Rockwell Deep in the last twenty years, crimps, in Karel's view, were the worst. The first qualification for the job was a big fat empty hole where normal people kept their feelings.

The second was a bootleg conditioner. With these (plus the constant stream of daft kids who swarmed into Rockwell High because the Space Field was there, and ended up in the Fourth Level of Rockwell Deep because it was cheap) they acted as suppliers of labor to some of the factories in Fourth Level. Nice, obedient labor, not liable to make a fuss about hours of work, or conditions, or pay. Nor did they need training—the conditioner would install that—along with a prohibition against remembering what had happened to them or where they had been.

Not many factories employed crimps. Scruples apart, if premises were being used for manufacture it was nearly impossible to conceal the fact from the surveillance computer. If not registered within three weeks they were liable to inspection as soon as the grace period was up. Registered premises, of course, might be inspected at any time.

Therefore the term for which crimped labor could safely be used on any premises was limited to twenty days. It was not practicable to install fixed equipment. No heavy machining: only assembly work, using ready-made components. Despite the high profits, the Dawn Patrols only had to salvage a few dozen victims in an average year.

Now, suddenly, more than that number had turned up in one *day*. Where could an operation on that scale have been kept secret, even for twenty days? Power supply, oxygen usage—both should have caused humps on the relevant graphs, big enough to attract attention. . . . At any rate it should be easy enough to locate the premises used, from that information alone. And after that it would be a matter of legwork to trace the lessees, and for once the cold-blooded bastards who thought a work force was not just to be used but to be used *up*, would get the punishment they deserved. . . .

But that day passed, and several others, and the clues that ought to have turned up in various kinds of records were simply not there; and although most of the victims were conscious and recovering from their physical exhaustion, none of them could give any useful information. After a week of strenuous effort Karel and his colleagues were forced to acknowledge, though not out loud, that the crimps and their employers had gotten away with it.

After a second week the same thing happened again.

"I was told you'd brief me," said Stephen *(call me Steve)* Atabarian; and smiled brilliantly. "Go right ahead."

He and Karel were sitting on opposite sides of a small table, part of the furnishings of a room in the transients' end of the Bachelors' Barracks on III/29th Street.

They were in plain clothes. Atabarian, a couple of years the elder and with five months' seniority in rank, had been seconded from the New Washington Police, and Karel had been instructed to make contact with him in total secrecy. He had therefore bleached his hair and padded his cheeks; he was also wearing blue contact lenses, which made his eyes itch; and his tunic was tighter and gaudier than he preferred.

Sergeant Atabarian, got up in a cheap version of current fashion, appeared very much at ease.

"I don't want to tell you a lot that you already know," Karel said.

"So you want to know how much that is? Let's see. . . ." He gazed thoughtfully at the ceiling. "The local version of the slave trade has suddenly taken to dumping its castoffs, in quantity, every Tuesday night. Despite a computerized surveillance system that keeps tabs on everybody and everything, the local cops don't know where the exes were employed or what work they've been doing for whom. In fact, having managed to stay outside the general tide of human misery for three centuries, your snug, smug little warren doesn't know what's hit it, which is why I've been sent to lend you a hand. . . . How am I doing?"

I have to work with this man. Karel held on to his temper and tried to assess information content while ignoring provocation.

"In fact it's been every *second* Tuesday," he said coolly. "Between sixty and seventy victims have been picked up first thing in the morning on three alternate Wednesdays. In about a dozen cases we got a fix on the last time they were seen; it was either some time Monday or on Tuesday morning, six weeks before we picked them up. If the vils stick to that pattern the next batch will be dumped in eleven days' time."

"And your surveillance cameras haven't got any picture of how it was done?"

"I think," Karel said, "that I had better start by briefing you on the surveillance system, what it's for and what its limitations are."

Atabarian lounged a little further, found the chair not designed for this and settled for crossing his legs instead.

"Whatever you say."

"The prime objective is to prevent crimes and offences in public—the system doesn't extend indoors. The computer monitors about a hundred thousand cameras, twenty-four hours a day—the ones in the Avenues work on infra-red as well as visible light. It's programmed to recognize certain patterns of behavior—attacks on the person, rioting, stealing floaters, vandalism, unlocking doors by a person not entitled to possess a key—and to alert the local police. It has the capacity to store the records from all the cameras for six hours. If instructed to it will transfer records of a particular area to more permanent storage, but unless the instruction is issued within six hours they will be gone for good."

He saw with satisfaction that Atabarian had dropped his affectation of languor and was paying attention.

"Unfortunately professional vils are well aware of this. The crimps' victims were presumably dumped more than six hours before the Dawn Patrols started. In the earliest available records they all lay where they were found."

"And dumping them didn't count as an activity to be reported for action?" Atabarian sounded incredulous.

"They were probably conditioned to come round just long enough to get out of the floater and stagger a few meters. It isn't illegal to sleep on the central divide—"

"It isn't? Then what's your Dawn Patrol for?"

Karel suppressed a sigh. "For one thing, it *is* a breach of local bylaws to remain on any one part of the divide for more than eleven hours. That's something to do with the Resettlement Laws. According to the city's lawyers, the part about taking over cultivated land not in individual occupation could be made to apply."

The Resettlement Laws had been brought in after the end of the Disruption, to enable abandoned farms and houses whose owners could not be traced to be taken over with a minimum of fuss. They had not been written with the Deep Cities in mind.

"What's the other thing?"

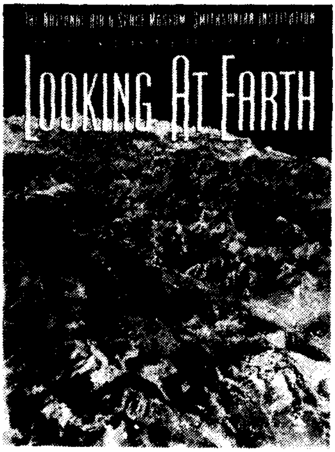
"What's—oh. The Patrols are a way of making contact with spaceheads who've run out of cash, before they decide to turn vil."

"Can't you just roust them out?"

"No. Illegal while we've got unoccupied housing. Resettlement Laws again."

Not for the first time, Karel wondered whether the federal government's insistence on applying to the Deep Cities laws designed for quite different conditions was due to resentment of their success in excluding the worst effects of the Disruption—or, as one fool of a politician had put it, cutting themselves off from the country's agony three hundred years ago. . . .

(Come to think of it, *he* went by some polysyllabic name or other. Could that have been Atabarian? There had been broad hints that the officer wished on to the Rockwell Deep Police by the federal government came from a family of pols.)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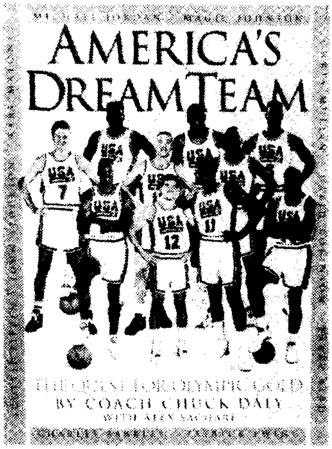
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Country's agony! Karel had never heard of any group or place that *didn't* try to cut itself off from the Disruption as well as it could. The ones that survived, kept any kind of civilization going, were the ones that managed it. When the reconstruction started Rockwell Deep had been one of the country's main sources of technological know-how. The Space Gate had been built where it was chiefly because of the unrivaled source of trained technologists and craftsmen available close by. (Hadn't scientists at Space Labs cut themselves off from the country's agony too? It wasn't till it was all over that they started coming out of the woodwork and demanding to build the things they'd dreamed up during the Disruption, because their work mustn't be wasted.)

So now a couple of hundred people a year got to land on uninhabitable worlds fifty light-years away, and ten thousand space-struck kids came flocking out to see them. And when they discovered that there was no way they could get any closer to the Space Field than the boundary fence, they flocked down into Fourth Level; and the crimps and the other predators came after them; and the Rockwell Deep Police Force had to deal with the mess.

Karel returned with a jerk to the matter in hand.

"The computer was not reprogrammed after the first dumping, because there was no reason to expect a repeat. The second was just like the first—groups of victims scattered over all four levels. As you said, it was a Tuesday night both times. So two Tuesdays later the computer was programmed to report vehicles leaving passengers on Avenue central divides at night on any level. That tied up a good many megabytes of capacity and police got called out forty-three times because of people who'd decided to go for a stroll before bedtime. Meanwhile the crimps were shedding victims by ones and twos in back alleys all over Fourth Level, to be found when people went to work in the morning. Three were found dead. And there's *still* no clue to where the factory is."

"Yes, well, that's why I'm here," Atabarian said.

Karel kept his face still with a considerable effort. Atabarian was going undercover in a Fourth Level flop—one from which crimps had recruited several of their victims—in the hope that he might be approached by a crimp, or, alternatively, might see approaches to someone else. Karel would act as his contact with Rockwell Deep HQ.

"I suppose there've been physical searches, as well as computer studies," Atabarian added casually.

"The whole of Fourth Level's been turned upside down—"

"Yes, well, brief me on that, will you? Why's Fourth Level so different from the rest?"

"Fourth's where the Top People used to live," said Karel shortly. "So when it got fashionable to live topside again, they were the first to move out. A lot of setts were bought up at rock-bottom prices and leased for commercial use—flophouses, sweatshops, offices.... There were problems over access; a good many of the workers live topside. So the Council had new entrance shafts cut to deal with the traffic jams, and expanded the under-level delivery and removal systems.

"Some of the new owners took the opportunity to do some private excavation under cover of the vibration. Whole sections of Fourth were riddled with bolt-holes and unauthorized passages. The surveillance system is crippled.... You couldn't set up a factory big enough to employ seventy people—probably twice or three times that number—on any of the other levels—"

"If the place is riddled with unauthorized bolt-holes, why not an unauthorized factory building—I mean excavation—as well?"

"Because there isn't room for it. There's enough space between setts to cut a bolt-hole, or a very narrow room, but no more."

A good many of the victims had been traced back to various flophouses on Fourth. So at least Atabarian would be looking in the right area.... Karel knew that his superiors had no faith in the scheme. Their colleagues in New Washington had made them an offer they couldn't afford to refuse. A young officer, not known to local criminals, working undercover, was the kind of idea likely to appeal to TriV commentators, however it looked to senior policemen. If, after it was turned down, the case continued to drag on....

"What cover story are you using?" Karel enquired.

"Oh, I'm on the run from a loan shark in New Washington."

Well, that made sense. Atabarian would never pass for a spacehead. Most of them came from country villages remote enough to have been bypassed by the Disruption. Such places were still in process of being reconnected to TriV and to the transport network, and the Space Field seemed to be the one possible goal in the outside world that the inhabitants had heard of. But Fourth Level did harbor more sophisticated refugees. Atabarian's cover would probably hold. The trouble was that the crimps were expert at concealing their traces and the spacehead population turned over so fast that the chances of any of them knowing anything worth discovering were slim.

"How do we keep in touch?" Atabarian enquired. "I gather you can't use radio down here."

"We'll use phones." Karel displayed one. "This is the speaker. The receiver goes into your ear. There are phone outlets in every room of the flop where you'll be staying—that's why it was chosen. There's one here, too." He demonstrated.

"How do I make a call?"

"The connection's made as soon as the phone's plugged in; but that phone's tuned to equipment in the sett I'll be using on Fourth. Right now that isn't switched on. I can plug mine in if you want to see it work—"

"No, no. But you're saying I can't call anybody direct except you?"

"That's correct. You call me, I leave a coded message with the appropriate person, and when he's free he calls back on a secure phone. You call me later to get the message."

"Suppose mine's urgent?"

"I use the code that says so." Karel hesitated a moment. "Or if you're having trouble and need help, I come to you. My room's a couple of hundred meters from yours."

"Suppose I have trouble somewhere else—not in my room?"

"Outdoors there are phone outlets every fifty meters; I'll show you how to find them. If it's serious trouble and you can't get to an outlet, drop the phone and step on it, hard. There's a screamer in it tuned to my equipment. It resonates in the phone network and the equipment will pick it up anywhere within a kilometer.... The surveillance system works even on Four, on the main streets. Stay out of back alleys and check with me before you accept invitations. If you've got a line on something don't try to follow it yourself; call me."

Atabarian didn't like taking orders from a fellow sergeant. He was radiating five months of offended seniority.

"Those are the instructions I was told to pass on," Karel added carefully. "The brass don't want to risk blowing your cover by making contact at this stage."

The visiting sergeant allowed himself to be mollified. For now.

"... These murals you people are so proud of. Copies, the lot. Because when your precious Founders were deciding what sort of people to let in, they excluded anybody who wasn't as mediocre as themselves. There's room in the streets here for second-hand copies of second-rate art from every part of history except our own...."

Karel reached out sleepily and found his chrono on the shelf beside his bed: 0237. This was the fourth night in a row that Atabarian had made his last call of the day in the small hours of the next one. Break contact? Better let him get his frustrations off his chest....

Karel knew, to within a few hours, just when Atabarian had finally realized how unlikely it was that this mission would come to anything. At the start he had called in at the specified hours, listing the people he had talked to and describing three or four who might possibly have been collecting information for the crimps. On the fourth he had reported as usual at around 1400; but his final call had been late and so confused that Karel wondered if he was ill.

Next day he had started on the current routine; calling late, spitting out a couple of sentences on the way his time had been spent, and wasted, and then embarking on an embittered analysis of some aspect of Rockwell Deep—on that first occasion, the regulations governing intoxicants.

To Karel the rules seemed a sensible compromise. No Deep City, dependent on complex technologies for viability, could afford to risk intoxicants in the air supply or drunks roaming the streets. Steve Atabarian apparently found them mean-spirited, insulting, and a breach of human rights. Karel concluded that his colleague had managed to get a skinful

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all the same, and, as soon as he was allowed to, went back to sleep.

Subsequent diatribes had been on other topics, though the word "smug" had still figured prominently.... Karel had developed a technique of dozing while he waited for the moment to say good-bye.

"... Look as though kids had drawn them, all higgledy-piggledy one on top of the other. Some of the legs aren't finished and I noticed some kind of pig that had a double set...."

Stars Above, thought Karel, unconsciously using an expression he had sworn to avoid, *he's talking about the cave paintings on IV/15th Street.*

Didn't the man know that they were forty thousand years old?—that is, the originals were. The copies had been done three centuries ago, the very first murals in Rockwell Deep. The Founders had elected to beautify the brand-new City with copies of established masterpieces, because for living artists to produce sufficient original designs would take a century. At the very least they had prevented Rockwell Deep from being, visually, a series of monotonous cavities bleakly surfaced with rock. And every so often one particular item would strike home to somebody, expanding their horizons and changing their vision so that they were never quite the same again.

Karel remembered coming down to Fourth with the rest of his primary class, to see the very murals Steve Atabarian had been decrying; as part of a lesson on prehistory. (That had been fifteen years ago; no school would come here nowadays.)

His reaction had been a bit like Atabarian's. In the streets around home the pictures formed scenes that made sense, but these were scattered higgledy-piggledy over the walls. The animals had been drawn properly, but the people were stick-figures he could have drawn himself. Except for one striding woman with a sheaf of rust-colored hair. She was not as old as the animals from Altamira and Lascaux, but pretty old. The teacher called her the White Lady of the Drakensbert. She wore trousers, like the ladies topside—his mother wore trousers when she took him there—and a sort of bag on a strap over her shoulder, and she carried a flower as big as a teacup in one outstretched hand.

At the time he had been more interested in the hairy elephants, and the bison whose front ends were so much higher than the back, but later on it was the woman who stuck in his mind. Several times he had thought of going back to take another look at her; but there were always other things to do.

Karel woke to the fact that the outpouring had stopped. He said goodnight to a huffy silence, and the line went dead.

There had been some kind of breakthrough, four days ago. He was sure of it, though he could not analyze what there had been in his brief contacts with HQ to make him so. When the crimps set out to deliver the new supply of slave labor on Tuesday night, and take away the worn-out discards, the police would be ready to move. Surely he and Atabarian would be included; if only because New Washington would be furious if their boy was left out.

This was Friday. He could stand another three nights.... Karel turned over and went back to sleep.

Next day, however, Atabarian made his third call at 2200.

"Karel, I've found one of the crimps' prospects. He was going to be slung out for not paying his rent. This morning he paid it for three days ahead. Been given a retainer for some job he's going to do next week. He thinks he's going to take part in a robbery, but no pro vil would pick him. And—wait for it—the job's on Tuesday. What do you think of that?"

"Sounds likely," Karel agreed. "I'll report it. Can you call again in half an hour?"

He made contact almost at once, and passed on what Atabarian had said. The senior officer at the far end of the phone line swore.

"Damn, that's just what we don't want now. We're all set to scoop the shark pool on Tuesday night. If anything alarms them we might lose half. The top half.... What would Atabarian do if we pulled him back now?"

Karel did not have to think about it. "He'd get on the phone to New Washington and complain."

"That's what I thought. Damn." A brief silence. "Here's what you do...."

"...They want you to mark him with a UV tag," Karel said. "Then the cameras can follow him and there'll be no risk of tipping off the crimps."

"The cameras can't follow him indoors."

"Neither could you, Steve. Not without being spotted. The crimps are pros. I'll bring the tags to the drop we arranged, in half an hour."

Atabarian had chosen the drop. It was an all-night eatery. Karel sat down and ordered a meat-bar sealed in a plastic wrapper. He sprinkled sauce on one end and kept the dispenser by his plate.

Atabarian sauntered in a few minutes later and took the next stool. Presently he asked for the sauce. Karel palmed the tiny pack containing the tags and stuck it to the side of the dispenser as he handed it across. Presently he took it back, for verisimilitude, and sprinkled it on the rest of the bar. A few minutes' hard chewing disposed of the stuff and, with relief, he got away.

The next two days were almost peaceful. On the first one Atabarian reported that he had successfully stuck one of the shapeless transparent patches—so thin that they had hardly any effect on texture—to the shoulder of the "prospect's" tunic, and that he was obeying orders to leave the fellow alone. On the second—the UV emission lasted only about thirty hours after the seal was broken—he put on another. Karel's contact at HQ reported that the tags had registered on the surveillance cameras, but nothing had been learned from the wearer's movements so far.

"Crimps probably told him not to come near them until it was time to do the job," Atabarian said when Karel, on demand, had relayed this.

"Standard practice," Karel agreed.

"So what was the point of labeling him so soon? I've clapped him on the shoulder twice; he's beginning to give me funny looks."

"Well, they might have decided to process him early. Pity if we'd lost *sight* of him."

On Tuesday Karel woke early, with the feeling of being in a vacuum; he kept yawning involuntarily in an attempt to get enough air.

The first event of the day should be Atabarian calling in at 0745. He made himself some coffee and sat down to wait for it.

Time stretched. Karel tried not to look at his watch. When he finally yielded he found that it was 0812.

At around 0915 he began to wonder whether he ought to report it; but there was no action anyone could take. He made breakfast, ate part of it, and waited some more.

At 1129 the phone buzzed and began to talk before he could get across the room.

"Karel, I'm in 794th Street. The bugger didn't come to breakfast, I saw him sneaking out at seven twenty-five before I had a chance to tag him, so I'm following him. He's gone into a toilet—someone's coming—"

The phone went dead.

Karel swore, helplessly, for thirty seconds. Then he called in. It was nearly half an hour before his contact called back.

"Bloody fool," he said, almost absently, when Karel had reported. "If he calls again tell him to go back to his room at once, and wait. If he's blown this operation, I'll. . . ." His voice faded. Apparently no threat was sufficiently dire.

Karel tried to kill time. He did press-ups, and sit-ups, and tried to compose a suitable report on the exercise machine in the bathroom, which had a broken joint. He went through the stack of videos again and confirmed that those stamped with the police department's logo were all well-worn classics and the rest crude pornography. He tried Tri-V and got a sit-com about a spacer trying to get to know the little daughter born while he was away; a standup on the question: "Should police officers be conditioned always to tell the exact truth?" and on the university channel a discussion of the recently revived "Space Trek XXX." He picked up one of the three books he had brought with him and thought about reading it again. At some point he prepared lunch, and presumably ate it—the plate got emptied. He took it out and washed it, several times.

He was still doing so when the screaming began.

Karel dropped the plate and raced back. The needle of the finder dial was still oscillating; the intensity meter had started to drop back, but the estimate of distance had been recorded at the start. He waited until the needle was still, then made a note of the direction.

A screamer was supposed to work

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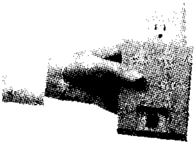

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for two minutes. It seemed to go on forever, mechanical and heartrending. When it stopped he put in an urgent call, and was answered immediately.

The contact listened in silence. Then he said, "No point in manning that post any longer. Button up and go to 17 Top 522nd Street. Take the third-story bridge over Ninth Avenue. Buzz two and two."

"What about Atabarian?" Karel said.

"What about him? If the crimps have got him—well, he thinks he's following the only clue we've got. Maybe they'll believe him. With any luck we'll pick him up in the trawl tonight."

If you're having trouble and need help, I come to you. He had been thinking in terms of fellow inmates of the flophouse deciding to gang up on Atabarian; not of a situation where intervention might—*would*—blow the whole op. He thought of Atabarian grinding the tiny phone underfoot as a couple of professional heavies grabbed him; feeling a needle run into his neck; waiting, till the drug took effect.... The fact that it was Atabarian's own fault didn't make him feel any better. The man was his *partner*—

"You got that address, Karel?"

"Yes, sir, 17 Top 522nd Street. Buzz twice, then twice again."

The door was opened by Captain Brown of Precinct II/West, his own CO. Inside Karel found five other officers grouped around a monitor screen that showed, at first sight, a street of houses like they built topside.

"That's Boundary Road," he said, startled. Only one street went in for that kind of false facades.

Boundary Road, with the setts on the outer side backing on to many kilometers of uncut rock, would have been the obvious place to look for the Slave Factory, except that it was where all the City's services stopped. Not just water and power, but the automatic distribution tunnels in the under-level. If the Factory had been using floater-vans for raw material deliveries and waste-removal they would have shown up in the surveillance records.

"Give the lad his money back," somebody said.

"Sit down, Karel, we shan't be moving before 2000, and there's a lot you don't know yet."

Captain Brown moved to another monitor and stuck a tape into the slot.

"First, we discovered how the crimps got their victims in and out without being seen. We got that from the surveillance computer. Not the records; there's been an insert in the programming of the cameras along this stretch of Boundary Road. For twelve hours every Wednesday night the computer doesn't get the real-time input; they play back the records for that period from the day before."

One insoluble question erased.... Karel said, "So you knew where the entrance had to be."

"A bit more than that." The captain's tone hardened. "We knew somebody in Precinct IV/West must have changed the program. Nobody else had access."

So that's why they suspected a leak in the Police....

"So," Captain Brown went on, "we had to find out where the entrance led to without tipping off IV/West. Actually the Feds were useful there. They brought in an expert—a seismic topographer, with the most sensitive instruments ever made. Did you feel a shaking—went on for a couple of minutes, five days ago?"

Karel shook his head.

"Nor did I, and I was waiting for it. The big shock was when the expert came in with the results. He hadn't just found a cave in the rock behind Boundary Road; he'd found about half a city."

"What? But—"

"Oh, not a leftover bit of Mu or Atlantis; it was cut out at the same time as Rockwell Deep. The expert suggested we have a look in the city archives. It was all there, under *Annex*, marked confidential.

"Karel, has it ever struck you that Rockwell Deep has never really been self-sufficient? Not for food. We went on getting bulk supplies from topside right through the Disruption. However, the Founders made provision for emergency production. Algal tanks, like they use in the starships, to recycle sewage and CO_2. It would have taken a hell of a lot of space to do that for a city this size; but if it had ever been needed, they had it ready with power, water, ventilation and so on, independent of the city systems, ready to be switched on. Entrances from the city, for workers, supervisors, and so on; and three topside, for bringing bulky items in.

"The entrances were camouflaged. Electronic locks; the key frequency was in the archives too."

Captain Brown took a piece of stiff plastic about the size of a playing card from her pocket. "We had some made up. Tested them on a door the crimps haven't unsealed. They work fine.... Anything else you want to know? ... Right. The schedule for tonight goes like this...."

During the last ten days Karel had often yearned for human company. Now, surrounded by companions in a state of pre-ops euphoria, he felt alienated from them. What was happening to Steve Atabarian? There had been times when he could have wished him a long fall into a black hole; but for ten days Atabarian had been his chief link to the outside world. The sudden rupture of the link had left a raw place in his mind.

He became convinced that the whole thing was going to be a mess. They would shut down the Slave Factory—there seemed no way they could go wrong over that—but the crimps and their employers would need warning in time to get clear, Atabarian would still be missing, and in a few days or weeks he would be found somewhere, dead.

In fact the operation was a complete success.

This, however, did not become known to those who took part in it until some time afterwards. Twenty minutes after he followed Captain Brown into the tunnels Karel found himself envying policemen topside, with their wireless communications. He had watched on the monitor while at two-minute intervals a series of floaters slid to a halt, a black slit opened in an imitation Colonial facade, and five figures in overalls shambled out, to be bundled in with callous expertise. Each time the floater had sped away, to turn into a side street and—hopefully—be picked up there by stunner-armed police.

Karel thirsted to know whether all the crimps were in custody or whether some had dumped their burdens in an unforeseen place and gotten away.

At least it was sure that they wouldn't make any profit today.

The planners of the op should have foreseen this place, but they hadn't made any arrangements to deal with it. Captain Brown had found a use for Karel soon after her group got in. He was in charge of the crimps' waiting room.

At first glance it had an eerie sort of normality. The chairs were standard plastic stackables, set out in rows of eight. Forty-two of them were occupied. The occupants came in all sizes and colors, but they had two things in common: they all wore white button badges pinned to the left shoulder of their tunics, and they all seemed mindlessly relaxed.

All except one. . . .

Karel looked hard at the exception. The technician who had been operating the conditioner when the police arrived gave him a weakly ingratiating smile and squirmed appealingly. No doubt he was uncomfortable with his arms handcuffed behind the chairback, but Karel's heart did not bleed. The girl who had been under the conditioner when they arrived was still there. Nobody, including the technician, knew what would happen to her if the conditioning was interrupted halfway.

He did, however, know why the people in the waiting-room had not reacted in any discernible way to the sudden entrance of half a dozen police.

"The intake? Full of docilin. They've been told to come here and sit down. They won't do anything else till the first effects wear off, couple of hours from now. They'll go on being obedient for another four, but—"

"How did they get through the door?" Captain Brown had said.

"See those badges they're wearing? Those are keys. The intake just walks up to the door and the sensor beam reads the circuits inside."

Karel had been left in charge until further orders. However, shortly after the forty-third chair was occupied, Captain Brown came back.

"Any trouble? Right. Come and take a look at this."

This was a smallish room with a heavy lock on the door; which stood open. It contained two patrolmen, one from the local force and one a Fed; and a series of solid wooden boxes. The lids of all but one were nailed down and reinforced with iron bands. The open one, at first glance, contained an interesting abstract pattern worked out in steel.

Karel continued to look at this until it suddenly resolved into a series of separate metal objects in overlapping rows. He felt he ought to know what they were—

"Forensic was right," said Captain Brown. "They said the stuff under those kids' nails, and driven into their skin, matched the alloys that were used for old-style handguns; and here they are."

Karel had seen and handled a gun during training—a modern one with self-propelled bullets and a laser sight that made it almost impossible to miss. Each precinct had one, kept in the safe and never used in Karel's experience. The police weapon was a stunner.

However, he had seen pictures of things like this. Every so often one came to light, hidden in the house of some oldster who had recently died, or buried in a neglected garden; even, once or twice, brought in for scrap by someone who did not know what they had.

Of course, forensic's finding explained why New Washington had butted in. A major object of the Reconstruction had been to eliminate guns as a factor in the social equation. The majority of people—even the majority of criminals—preferred it that way.

It was logical, though, that some people should feel that their own positions could be greatly improved by guns—provided that they had a monopoly.

Criminals? Any crook with the brains to set up this operation ought to know that the monopoly would not last long. On the other hand it would appeal to certain kinds of politicians. Some group unlikely to gain power by legitimate means, but with a strong conviction that they were entitled to use anybody or anything to get hold of it.

No chance of finding them here, and not much that the people who *were* here knew whose dirty work they were doing.

He said, "One up for forensic. I'd better get back."

However, none of the blank-faced youngsters in the waiting room had come round sufficiently to wander away. Instead, the number had increased. When he left there had been five empty chairs in the foremost occupied row; now there were three.

There was something weirdly similar about the way they sat; as though their flesh had settled into the chairs. Their faces, black, brown, or white, all had the same slack lines, as though they had melted a little; the mouths were all curved into the same meaningless imitation of a smile.

Yet another one slouched in and dropped into the empty chair next in line. Karel, looking at the new arrival, saw from the tail of his eye that the man beside him was Steve Atabarian.

None of the police who took part in the raid got any sleep that night. Apart from the need to arrange accommodation for several hundred people—twenty-seven of them arrested, seventy-three coming round from docilin, two hundred and nineteen in various stages of exhaustion

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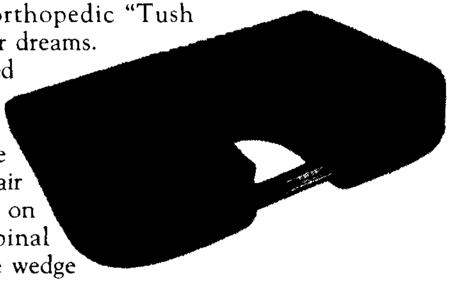

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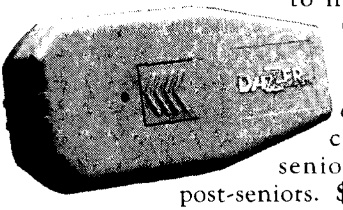

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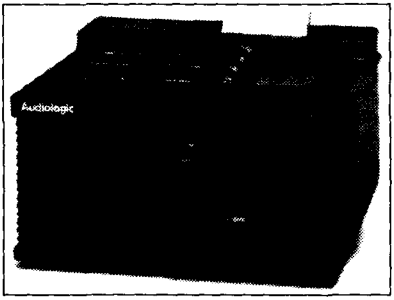

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At about 0745 Karel, slightly high on a double issue of Wydawayk, was typing in descriptions of thirty-two released slaves who had been taken to a hospital topside, when the noise level of the busy and overcrowded office suddenly dropped. He looked up. Steve Atabarian was standing in the doorway.

All the "intake" had been interviewed, including Atabarian, and Karel had taken a couple of minutes to call up the summary report. Apparently Atabarian had not been spotted as a cop. The crimps had seen him following their "prospect" and assumed that he was trying to hijack the latter's (fictitious) job. One of their "prospects" had been arrested the night before; they were a body short. So they hauled him in. . . .

If he had been identified as a policeman the final result would probably have been exactly the same; killing him would have been troublesome—it took a lot of organization to get rid of a body in Rockwell Deep—and also wasteful. No doubt he would have had a worse time beforehand, but Karel suspected he might have preferred it that way.

He looked ten years older than before—face drawn and pinched, body stiff. It could be some after-effect of docilin, but it looked like rage.

Atabarian strolled between workstations whose occupants had stopped work in order to stare, and halted to give Karel a smile full of teeth. He had one hand in his pocket, and Karel wondered what else was there.

"Hail and farewell, *partner.* I couldn't leave without saying goodbye."

"You're leaving now?" said Karel stupidly.

"I'm not needed any more. Not even as a witness. Seventy-two others have given testimony exactly like mine. They tell me you had a part in the glorious raid, *partner.* Will you get a medal for it?"

"Not likely."

"Too bad. Well, here's a souvenir." He drew his hand from his pocket, giving Karel just time to get his hand up and catch the thing as it was flipped into his face.

Atabarian turned on his heel and marched out.

There was a tiny smear of blood on Karel's hand; automatically he wiped it off. He was holding one of the white pin-on buttons, an electronic key to the Slave Factory. The pin was open.

Karel pushed it carefully into the catch, and stuck the thing in a pocket. Then he returned to his typer and finished the report.

PART TWO

At ten in the morning there were not many people around in the side streets of Second Level, and the few whom Karel encountered gave him a wide berth. They were respectable citizens, all of them, with consciences free from illegality; but a cop with that look on his face. . . .

Karel didn't notice. His mind was staging a replay of the scene in Captain Brown's office, half an hour ago.

He particularly resented her parting remark: "Look, 'Tian, everybody needs a change from time to time and you're no different. Why don't you go topside for a bit? You could take in a ball game. . . ."

To his certain knowledge Captain Brown had last gone topside three years ago, stayed twenty minutes, and had been chased down by a mosquito. As for ball games—*were* there any, this time of year?

Damn it, she had no *right* to send him on leave. Technically he might be due for it—even past due, if she wanted to split hairs—but that was no reason to suggest that he *needed* to rest. His work was *not* starting to suffer. He could retrieve data or write a program faster than anyone else in the precinct; focus a stunner on one head in a crowd so that the one beside it didn't get even a buzz. His reflexes were fine, his weight was OK—if he had lost a little in the last month that was all to the good—and he could still keep his temper with the general public, and his colleagues, if they would just *let him get on with the job!*

In fact, Captain Brown had more or less admitted that the order had nothing to do with his efficiency.

"It's a good time for you to take it, that's all," she said.

"Good?" echoed Karel. "Captain, Markovitch is on paternity leave. Kawaguchi's off sick. Linacre's going on a course next week—"

Captain Brown waved a dismissive hand. "So understaffing's normal for the time of year. Come on, 'Tian; you can't go on overworking forever, your efficiency will suffer in the end if it hasn't already." She hesitated, just perceptibly, then took the plunge. "What makes it a good time is that we've got a replacement available. Coming today."

Karel's heart dropped several centimeters. He felt it distinctly.

"A *replacement?*"

"Knows the area already, too. He was here—when? Must be over three years ago. Sergeant Atabarian—but he's a lieutenant now. Remember him?"

I knew it, Karel thought.

"Going for his Ph.D," continued Captain Brown. "Something to do with the connection between space travel and public unrest, and he wants a chance to collect data."

Captain Brown held a master's degree in criminal psychology and forensic methods; minimal for her rank. Now she looked Karel in the eye, daring him to remember her often-expressed views on cops who spent time on doctorates during working hours. "I said we'd be glad to give him the chance."

Meaning, as Karel knew, that Atabarian's father was in Congress, and relations with the Feds were difficult enough already.

So Steve Atabarian, the Boy from the Big City, was paying them another visit. Slumming again. . . .

Did Ma Brown think he didn't know how to behave? Karel had stayed polite under the city man's needling when he was twenty-three; did she think he would have forgotten how to handle it now he was twenty-six?

All the same, now that he came to think about it, did he want to spend the next two weeks in the same precinct as Steve Atabarian?

Maybe Captain Brown had done him a favor after all. Also, his curiosity was suffering from a long-standing itch. Professional etiquette had prevented him from scratching it so far; but if he chose to follow up an advertisement while he was on leave it was nobody's business but his own.

Karel opened the door to the sett quietly, taking pains not to let it hit the end of its groove; but it appeared that his mother was out. He went into his own room, opened the closet, and examined the contents dubiously. She had remarked, once, that when he bought clothes for off-duty he always seemed to pick something that looked like his uniform; and when he came to look at them *en masse* there seemed to be some truth in that. He burrowed to the back and unearthed a tunic he had forgotten he had; it was probably out of fashion, but it certainly had no suggestion of the police about it. He changed his boots and trousers also and switched on the newstaper, keying for local advertisements.

The one he wanted was not there.

Did that mean—no, advertising cost money; the fellow had probably decided that a fortnight was long enough to run it. He had made a printout of it once; now where—he had wanted to check out certain points on the office computer.... He stuck a hand into the upper pocket of his uniform tunic and extracted a slip of paper.

It was a succinct little notice, just a name—*O.M. Rivers*—an address—17 IV/East Street—and... not exactly a profession. An occupation? A skill? That, more or less, was what he wanted to find out.

If you stuck to the Avenues on Fourth Level you would never know that anything was wrong, Karel thought as he crossed a bridge over IV/Sixth Avenue. The central gardens were in good order; the reliefs on the walls (hereabouts a heavily sanitized version of Mayan carvings) had not been vandalized; the anechoic coating of the bridge itself had been recently renewed.... He descended the stairway into IV/40th, turned presently into IV/42nd, and after walking for ten minutes found the turn to IV/429th Street.

The signs of decay missing in IV/Sixth Avenue were abundantly present here. The two levstrips looked all right, but on either side the surface of the roadway had been allowed to crack and *stay* cracked. The central divide was a stone trough about two feet wide, containing a few desiccated stalks and a good deal of rubbish, much of it at least a week old. As in all side-streets the ceiling was only twenty meters up and he could see dark patches on several of the glow panels, and at least one prominent crack.

All that remained of the original murals were a few scratched-up areas of color. Graffiti, however, was abundant. The place did not actually stink—molecules of that sort would have set off alarms in all parts of the ventilation system—but it felt as though it did.

Sett-numbers had suffered like the rest of the environment; the first clearly visible one read 23. Suddenly unsure of the number he wanted, Karel felt in his pocket for the printout. Something sharp ran into his hand.

There was a bead of blood on the side of the index finger. Puzzled, he felt again, more cautiously, and discovered something smooth, flat, rounded.... He took it out. It was a white pin-on button about three centimeters across.

It took him a moment to realize how it came to be there.

Automatically he pushed the pin into the catch and made to throw the thing into the trough. But that was not what the trough was meant for.... Half-amused at this surfacing of childhood training, Karel stuck the pin back in his pocket and took out the scrap of paper instead—17. Retracing his steps and counting, he found a doorless entrance and walked cautiously in.

The vestibule was not too badly lit, and had been recently swept—where the surface was not too battered he could see the brush-marks—and the heading of the directory on one wall confirmed that this was 17.

The directory was of the type common in short-stay setts, with fixed office numbers and the occupier's name on a board slotted in. Judging by the variety of typefaces, the occupants brought their own boards with them; judging by the battered edges most of these had been recycled a number of times. Karel's eyes, running down the assemblage, was arrested by a patch of glaring white which said simply: NAME. The number alongside was 419; the rest of the board was so much faded, he almost failed to see that the name was the one he sought.

Some of the boards mentioned the owners' occupation; not this one.

There was an elevator, or at the least a door with the usual button beside it. After a three-minute wait Karel began to walk up.

The staircase was broad and showed traces of past grandeur; but the landings and the passages leading from them were minimal products of a reconstruction aimed at dividing once-spacious rooms into the maximum number of lettable cubbyholes.... Plodding up, Karel realized that he hadn't worked out a story. Why was he consulting Rivers? Paranoia—whether a partner could be trusted? Whether the police were setting traps for him? Hope—whether an uncle planned to leave him money, or not?

Third floor. In all probability O.M. Rivers was simply running a dull variation on a standard scam. There hadn't been a really new racket in five or six centuries. If one did appear it wouldn't be in a dump like this; the last refuge of the incurably small-time.... He reached the fourth, and last, floor.

No. 419 lay at the far end of a slot just wide enough for Karel's shoulders—he found himself fighting the urge to walk crab-wise. He stopped in front of a frosted-glass door rather cleaner than its neighbors. A light behind it illuminated the full text of the advertisement that had so intrigued him ten days ago:

O.M.
RIVERS
Consultant Telepath.

He was still considering this when the panel slid sideways, giving a view of a small office with no visible occupant.

"I suppose you'd better come in."

The voice was light, husky and lacking in enthusiasm; it came from somewhere out of sight.

"Be with you in a minute, Lieutenant," it continued. "You might as well sit down."

Karel walked through the door and heard it close behind him.

The office was furnished in standard fashion; executive chair backed against the wall opposite the door, its broad arms studded with the controls of the equipment they housed; visitors' chair, six inches lower, facing it. Apparently O.M. Rivers felt no need for a desk between himself and his clientele.

In the wall to Karel's left was a second door, slightly ajar, from which came the sound of a running faucet. It stopped and was replaced shortly afterwards by the gurgle of water being sucked into the filtering system.

Half a minute later the door opened fully. The man who came through it was dressed in a charcoal-grey suit which had cost, Karel estimated, about six times his weekly salary and might have been worn by a bank manager of conservative taste. His hair, on the short side of current fashion, was thick and dark, with occasional flecks of grey; despite which he appeared to be about twenty years old—

(Nineteen)

—or even younger.

O.M. Rivers, presumably, walked across to the executive chair and waited.

"Do sit down, Lieutenant," he repeated patiently. "What can I do for you?"

"What's with this lieutenant stuff? I'm not a bloody spacer!"

"Mr. Karel, if you prefer. Since you're on leave." Rivers sat down and pushed his hands into his pockets. "And this isn't your precinct. So what do you want?"

For this sort of scam, learning the faces of the city police would be a useful precaution. . . . Lieutenant. *He hadn't seen me when he said that. Scanner somewhere along the corridor—?*

Karel sat down. He decided to get the initiative back. "Why don't you tell *me* that?"

"Because words are a lot more efficient than telepathy for ordinary communication. Human beings evolved as speech-users. Telepathy's a sort of by-product of mental activity. Most people suppress it as soon as they learn to talk. I think so, anyway," added Rivers in a different tone. "There's no proof. . . . If I've got to guess; well, I don't see how you can arrest me. There's nothing illegal in

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claiming to be a telepath. You'd have to prove I take money for it, and I don't."

"Sergeant Krasta reported as much. She found that very curious. So do I."

Rivers shrugged. "I don't need money. [*My second stepfather left me some.*] I dare say it was a mistake, though. People don't think it's worth anything if they don't have to pay."

"She also reported that four of your clients—would-be clients—were told you couldn't do anything for them. You sent them away."

"They just wanted me to spy for them—tell them whether partners or husbands or employees were trying to do them down."

"And you couldn't do that?"

"Not reliably. Not without getting to know the person really well. Anyway it's not the sort of thing I want to do with my life."

Karel blinked—mentally, if not in physical fact—but decided not to follow this lead for the moment.

"The fifth one said you had actually been of some help, but wouldn't give details. Something to do with his mother, apparently."

Rivers' eyes opened wide. For a moment he seemed at a loss for words.... "Nothing illegal," he said finally. "Just private."

"You didn't charge him, either.... Oh, I forgot. A legacy from—" for a fraction of a second Karel paused; he hadn't really taken that in—"your second stepfather. He must have been a wealthy man."

"My mother prefers them," said Rivers, after a moment's pause. He spoke absently, as if thinking hard about something else.

"What the hell have you been doing here, then? What's all this for?" Karel waved a hand at the office; the executive chair; the inscription just visible in reverse through the frosted glass of the door. "What are you getting out of this? What do *you* want, if it isn't money?"

"To find a use for telepathy."

"What?"

Rivers made a small gesture of resignation. "Well, what *is* it good for? What would *you* do, if you found you were a telepath?"

"Well, I—" Karel's brain refused to get a grip on the question—"I'd study it, I suppose, for a start."

"I've done that. I've been studying it ever since I found out [*what was wrong with me*] what it was. A year ago [*when I got back*] I spent three months at the Institute of Parapsychology. It was a dead loss. All they did was repeat the old experiments, with more and more precautions so we couldn't cheat. They never thought of finding out what it could be *used* for, or of trying to help the ones who were in trouble because of it—"

"Trouble?"

"Why do you suppose so few people are telepaths? It's a nuisance. You keep getting information you're not supposed to have, and people think you've been going round eavesdropping or reading their letters."

He grimaced at some private memory. "—And it can interfere when you're trying to think. I believe that's why most people learn to suppress it, even before they've noticed it's there.

Just one or two stay functional—I don't know why. There was one girl at the Institute who couldn't *stop* making pickup on one person after another, all the time; she just never got a chance to think for herself.... I taught her how to cut her thoughts off from outside interference. That was useful—to her, anyway—but it's a negative sort of usefulness, and I don't know anyone else like that."

"You had one satisfied client here," said Karel in a neutral tone.

"Yes, well...his mother had a stroke and couldn't talk. There was something she wanted him to know.... That's not a common situation, either."

You could almost believe he was genuine, Karel thought. *It's a very good act, but what is it* for?

"I'd have thought," he said experimentally, "that there was a fairly obvious use for it—psychiatry."

"No, thanks! I made pickup once on somebody who was going through a suicidal depression. I thought about killing myself, for a bit. Then she came out of it. She didn't know what caused it, so neither did I. All that stuff about hunting through people's subconscious minds is the bunk. Telepaths only make pickup on conscious thoughts—anyway, I do."

The boy really had given a lot of thought to this performance.... Suddenly irritated, Karel said "If it's so hard to find a use for it, why bother? You said yourself, speech works better. Telepathy's a nuisance. Just cut it off, and concentrate on something else."

Rivers' mouth tightened. "There *has* to be some way to make it useful. I can't just waste it." [*Cost too much.*]

"Well," said Karel irritably, "if you expected to get any worthwhile ideas from people in this district, you probably ought to see a shrink yourself. It's not a healthy place for social experiments."

"I found that out." Rivers grimaced.

Karel's professional instincts stirred. "Run into something nasty, have you?" he said.

"Yes, I have." Rivers frowned to himself. "I suppose...maybe...I don't really know enough to go to the police."

"Let me judge that. Enough about what?"

"It sounds so melodramatic."

"Never mind. What is it?"

"A man... who kills people. It's his *job.*"

Karel sat up. "Name?"

"Don't know. It's one of the meaningless ones."

"How do you mean—meaningless?"

"Oh—" Rivers drummed thoughtfully on the arm of his chair—"a lot of names either mean something sort of—factual—like Brown, or Smith; or they *sound* as though they do. Like yours."

"Mine?"

"Karel. Song. Christmas. You don't exactly think of those things when you think of your name, but there's a sort of—association.... That's how I knew who you were." He glanced at Karel, and drummed faster. "Look—that's why I had my name board painted that way, with Name at the beginning. People look at it and think of their own names—it's like the start of a questionnaire. And of course they're thinking of *my* name—when they come through the door, usually, but in any case when they look at the directory. I had *O.M. Rivers* written kind of dim, so they'd look harder. That tips me off in time to make pickup on their own names. But this man—the name he thought of began with an M, I'm fairly sure, but he didn't associate it with anything."

"Well, what did he look like?"

"I didn't see him. He just looked at the board and thought: *Bloody mind-reader. What's The Man waiting for? Better delete him now. That way he can't snoop.*"

"What the hell kind of a story is that?" exploded Karel.

"I haven't finished. Just afterwards another man came to see me. I got *his* name, it was Undershaft—"

The hell *it was.* Karel's interest sharpened.

"—But he called himself something else—McDonald, I think. He was a quite small man, perky, with white hair and very black eyebrows. They had very long hairs right in the middle, like antennae."

Karel drew a long breath. Skepticism wavered....

And returned. This could be part of some elaborate trick, directed against one underworld figure by another.

"He *said* he wanted me to check whether someone was planning to cheat him, but actually his boss had sent him to find out whether I might be troublesome. Making pickup on things they didn't want known.... The other man was just making sure nobody was around from rival—organizations. Undershaft was thinking about him as he came up the stairs." Rivers breathed deeply. "If it hadn't been for that I might have used his real name to greet him, like I did with you."

"Jesus. You've been mixing in dangerous company, my lad."

"I know. I convinced him for the time being—"

"What, that you *were* a mind-reader?"

"No, of course not. That I was a fake. He wasn't 100 percent sure, though. He thought that maybe I ought to be gotten rid of, just as a precaution, but their boss had cut down on killings because disposing of the bodies got more difficult all the time—"

Karel slapped his knee suddenly. "Got you!"

"What? How?"

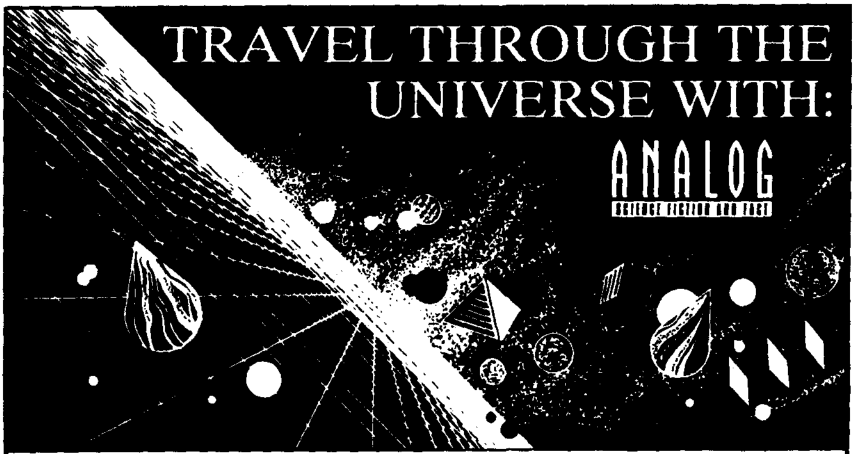
"You said this happened *yesterday?* If you'd really tuned in—made pickup, is that it? on Billy Undershaft wondering whether he shouldn't tell Esra Mungo to delete you—hell, you'd be out of this place in ten minutes and cut all connections to it. You're trying to tell me you got a threat like that, and came in to this office the morning after? Bullshit!"

Rivers sighed. "I hadn't planned to come here again. I got a message asking me to meet somebody—"

"And you *came?*"

"Oh, it wasn't Undershaft—or one of his minions. It was a woman I know. Well, I haven't met *her*, but her brother's a friend of mine."

"And you arranged to meet her



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here?"

"I didn't arrange anything. It was a recorded message. She got this address and number from the advertisement. I can't call her back because she's in transit.... Don't worry. Undershaft won't act without instructions, and the big boss is away until tomorrow."

"Suppose Fratricelli changes his mind—that's Undershaft's boss, in case you didn't know—comes back early, decides you *are* a menace to whatever his current plans are and sends Mungo after you?"

"In that case—well, there's a bolt-hole that starts down the passage and comes out on Third Avenue. I'd have plenty of time to get away."

"How would you know, damn it?"

"Same way I knew you were coming."

Karel stared at him. "You claim you're planning to stake your *life* on telepathy? That could *really* cost you, my lad."

Rivers was silent for some moments.

"You still believe I'm a fake, don't you?" he said at last. "All right. Think of something."

"What do you mean?"

"Pick something concrete—definite, anyway. An object. The title of something. Just so there can't be any doubt whether I'm right or not."

Like most people faced with that particular challenge, Karel found his mind a blank. He glanced round the room—

"Not something you can see, I might have noticed you looking at it."

Something concrete... floors, streets, rubbish trough....

"Right," he said.

"A... button?" said Rivers doubtfully. "Oh—the sort you pin on. Like a badge.... With a light-power cell on the front. Electronic. A key to something.... Souvenir. Three years ago, another cop, snow, deep and —Stephen. Atapub—Attabar—something. Why's he come back? Snooty bastard. Took a hell of a chance, disobeyed orders and it went wrong—" The rapid, uninflected voice broke off. "All *right,"* said Rivers, in a different tone. "I've stopped."

For a couple of seconds he and Karel exchanged stares in silence. Then Rivers said "Why did you pick that subject, if it's as private as all that?"

"It isn't—I didn't think—Damn it, let me get my breath back!"

Karel shut his eyes and tried to make his mind blank. One thought persisted, clear and sharp-edged; *There was no way he could fake that.*

"Do you want a drink?" enquired Rivers suddenly.

"What—no." Karel opened his eyes. "... Yes. Just water."

Rivers went through the farther door. The faucet began to run. Rivers returned with a glass of cold water. He passed it over and sat down.

"I ought to have cut off sooner," he said apologetically, "but I didn't realize straight off that all those associations were involuntary. Anyway, I didn't understand most of it."

Karel looked at him. "What did you understand, then?"

Rivers gave close attention to his fingernails. "Well... that button had something to do with an undercover job with another police officer. You didn't like him. You had to get into some kind of secret place. The button was the key. He got hold of it. It was dangerous—well, *something* was dangerous—that was the bit I didn't understand."

"You really are a mind-reader," Karel said.

Rivers shook his head.

"I didn't *read* anything. I just made pickup on what you were thinking. You started a chain of associations and I followed it further than you meant me to. Bad manners. I'm sorry."

Karel drew a deep breath.

"Well, however you did it, you're right. I was on an undercover job with Steve Atabarian three years ago. It was part of the investigation of the Slave Factory—you must have heard of that, it was all on TriV. The button was an electronic key to the hidden doors. He threw it to me afterwards—as a souvenir. And you were right about something else—I didn't like him."

"I read about the Slave Factory," said Rivers thoughtfully. "Not then—I was [*off world*] out of the country. In a magazine. One policeman got captured by the slavers and had to be rescued. Was that Atabarian?"

Karel nodded.

"If all that had happened to me," said Rivers thoughtfully, "I wouldn't want to come back to Rockwell Deep. Not at all. Why do you suppose he has?"

To solve one of our standing problems and show us all up for the hicks we are.

Now *there* was a thought that rang absolutely true. On the verge of speaking it aloud, Karel pulled himself up. He had already said far more than he should have about a fellow officer. He looked suspiciously at Rivers; just what powers were included in telepathy—?

No, it was simply that the boy really *listened.* Any interrogator learned how effective that could be. . . .

"How should I know?" he said. *"I'm* not a telepath."

Click. That was the answer Rivers had been aiming at. Now why—

Softly and carefully—sneaking up on the subject? Rivers said, "As a matter of fact, I rather think you are."

Ridiculous. Karel tried to say it, but the word aborted somewhere on the way to his mouth.

Possibly his face said it for him. Rivers leaned forward and spoke earnestly.

"Four times at least you've echoed something I didn't say, but thought about. Two of the times could be explained away as coincidence. One of them just might be knowledge I didn't know you had—my client told me he refused to tell the—er—sergeant anything about the reason why he consulted me, but he could have let slip that it concerned his mother and the sergeant *could* have mentioned it in her report. But how did you know my inheritance came from my *second stepfather?"*

"Damn it, you told me!"

Rivers shook his head.

"I wasn't even aware of thinking it,

but I easily could have, out of habit. Calling him that was a sort of . . . I suppose it was a joke, in a way. A family joke. Not something I'd say to a stranger; and anyway I remember what I said. You made pickup on my thoughts that time, at any rate. . . . When you were young, did you get into trouble for knowing things you weren't supposed to?"

"No." It came out in a croak. Karel cleared his throat. "My parents said kids always did find out everything; you just had to avoid doing things you wouldn't want them to know."

"They must be very sensible," said Rivers wistfully.

Yes, and I'm too sensible to swallow this. What's the scam? Offer to teach me how to use telepathy—at a price?

Something indefinable—nothing so obvious as a raised eyebrow—happened to Rivers's expression.

"I don't carry caryatids catercornered," said Karel with emphasis.

"I beg your pardon?"

Karel felt his jaw-muscles sag, as the syllables reechoed in his mind. . . . He said furiously, "You did that!"

"Yes. Sorry. I won't do it again."

"You . . . clever, aren't you?"

Rivers shook his head.

"No, but I've spent a lot of time working out how to test whether people are telepaths . . . and how to convince them of it if they are. You see, there was a second reason why I put out that advertisement. I wanted to find some more telepaths. There's not much I can do on my own—"

"You've got all the ones at the Institute of whatever-it-is."

"They're institutionalized. I mean, they've adjusted to the idea that they are freaks and telepathy is a laboratory curiosity. They don't want to be disturbed. And they're not really very good at getting things done."

Karel's annoyance was halted and then swamped by the sudden blossoming of an idea. He tried to stand back and examine it coolly, but it overwhelmed his caution and got to the tip of his tongue almost at once.

"You *can't think of a use* for telepathy? It's obvious! Police work! Interrogation! The big problem *always* is to know whether somebody's lying or speaking the truth. If I could read their minds—all right, *make pickup* on what they're thinking—stars, it would cut the work by 90 percent!" He broke off, catching sight of Rivers's expression. "All right, why don't you just say it: *it's not the sort of thing you want to do with your life!*"

"That's not the problem," said Rivers. "I was thinking of some of the difficulties. Probably telepathy *could* be useful to a policeman, in fact I dare say you've been using it all along without knowing it, but actually people don't always *think* the truth, any more than they tell it."

"Right," said Karel more soberly. "So what you learned by telepathy would have to be checked against everything else. Most of police work is that, anyway. But it would give us a whole lot more *to* check, a whole lot of starting points."

"I suppose so," said Rivers, without enthusiasm. "But how are you going to explain them to the officers you work with? Are you going to tell them

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MXSC-3

you're a telepath?"

Karel pictured Captain Brown's reception if he did. He could ask *her* to think of something....

His credulity suffered an abrupt collapse. Was he letting Rivers make a fool of him? There could be other explanations. Hypnotism. A focusing microphone that could pick up laryngeal subvocalization. Some kind of projective conditioner—

Hell, *that* would be worse than telepathy....

Rivers had pushed back the cuff of his expensive jacket and was studying a chrono. It was an elaborate affair; one of those cheaply-made copies of a spaceman's chrono, programmable for different day-lengths, that was sold to people who wanted to pretend they'd been to space.... Come to think of it Rivers had claimed to have been off-world. Well, there were tours of the Moon; a boy with a wealthy second stepfather might have been on one....

Something prickled in Karel's memory. Boys in space—no, *a* boy in space—

—landing in another couple of days... thought it was worth trying to reach you... don't start worrying (stack?) the leg's mending nicely now... new equipment... and two are with me... midday but if you can't get to the field don't worry ...long shot... see you ...signing off. Father (Dad?)

Karel said blankly, "What the hell was that?"

Disaster.

"Why? The leg's mending... Who the hell?... It felt... Your father? Landing in a couple—a space ship? Your father's a *spacer?* You said you'd been off-world.... My god, you're *him*—The Boy Who Went To Space—you're—"

Hell bell ball wall well ill all ill muddle huddle bubble trouble kid did bid bad Bab better be dead dead dead like blank point blank Point Blank Point BLANK BLANK BLANK BLInkblank....

There was hardness... somewhere. Presently, it located itself under his back. Water on his face... damn fool *weather*... go topside and get rained on.... No. Go... to the bell... *ball.* The ball on the wall of the well... ill... Damn fool game, throwing balls point blank... blink.

Karel blinked.

"Thank goodness. How do you feel?"

The voice was a long way off, at the top of the well or behind the wall.... So what was the good? Or ill....

"Blank." It was the right word.

"Does your head hurt?"

"No... just blank. What happened?"

"You hit your head."

"Damn stupid ball game, hitting point blank."

"What?" said the voice sharply. The word ricochetted off the wall and suddenly his head was aching, quite badly.

"What was that you said?.... Lieutenant Karel. What did you say?"

"I said," he repeated, with painful clarity, seeing each of the words outlined against a glare of light "let's *not* go topside and go to the ball game....

Who are you?"

Hesitation. Decision.

"My name is Rivers, Lieutenant."

"One River, two Rivers.... You've made my face wet."

Something dabbed gently at the raindrops ... river drops.

"Do I know you?" he said.

"Not very well."

He decided to open his eyes. Blank ... the ceiling. His eyes focused and he realized that there were cracks in it. Not blank, then.

Karel tried to sit up. He regretted this immediately, but a strong arm pushed behind him and forced him the rest of the way. The ball inside his head rolled to the lowest point and was still; a bulk displacing everything else. One time when he switched on his terminal everything had disappeared from the center of the monitor, leaving a fringe of broken file-names around the edge. His thoughts felt like that.

"Can you get up and sit on the chair, do you think?"

The person called Rivers was staying behind him. Out of sight. That seemed to mean something.

A force was applied under his armpits. He said, "No!"

Something sighed in his ear. Maybe if he got up higher the ball blank blank ball in his brain would fall out. Karel gathered his feet under him and rose, very cautiously. No catastrophe. He saw a chair, stumbled to it, and sat down with his eyes shut

"You're all right there? Good. Look, I'm sorry but I have to leave. There's a doctor in this building, he came and took a look at you but he had to go back to a patient. If you need him just press the Call button on the armrest, I've tuned it to his phone. He'll call a floater for you if you want one. He's been paid, don't worry.... How do you feel?"

Karel had no idea how he felt. Not hurt. Not all right either. Not himself.... He mumbled something. Apparently it was encouraging.

"Oh, good. I'll go, then. The rent's paid till tomorrow—stay here till you feel like going."

The door sighed open, and closed again with a faint click.

How long Karel continued to sit there with his eyes shut he had no idea. Things inside his head were slowly coming back to normal and he was content ... no ... he acquiesced in staying where he was. He was beginning to suspect that eventually he was going to be angry, even very angry, but for the moment—

Feet sounded rapidly in the corridor and he felt a draft from the door

Karel opened his eyes. A woman was there. Tall, with a sheaf of reddish-brown hair hanging to her shoulders; she wore slacks of much the same color, with a white shirt. The strap of the quiver crossed her shoulder, but there was no flower in her hand. She looked worried and uncertain. No wonder, poor girl; the world had changed a lot since she was first painted....

She said in a tight voice "You are ... O.M. Rivers? But no. I have no time to waste. You are Richard Jordan, I think."

Giving him no chance to reply she

went on, "I am Jeanne Leclerc. My brother has spoken of me, perhaps—no?—but in any case I am the sister of Henri Leclerc, who came to consult you two days ago."

Karel cleared his throat.

"I'm sorry." His voice sounded rusty. "But—"

"Oh, do not say that it was confidential—all that nonsense. I tell you, I am his sister. You must have seen that he—he is not good to take care of himself. I would have come with him but he slipped away. Mr. Rivers, if you are Henri's friend—"

"I'm not Rivers," Karel said.

He felt round the blank in his mind for something further to say. "Sorry. Rivers was here, but he left."

"Not?" Her eyes searched his face. "He would be younger. . . ." He saw her swallow. She straightened up and took control of her expression. "I . . . am sorry to disturb you." She turned to go.

"No. Wait! You said you need help. What's wrong?"

"It is . . . my brother. He ran . . . no. He came to this city and I need to find him."

"And Rivers knows him?"

"I think. Perhaps. When Henri saw that advertisement . . . the name is not the same, but he said it was one that Richard might choose. The song, you see—'One More River'. . . ." She saw his incomprehension and shook her head. "If it had been Richard he could help me to find Henri, but perhaps Henri made a mistake."

The door banged back in its groove and two men walked in, one of them talking.

"You'll see, the equipment's just what you were asking for—what are you doing here?"

Karel was not ready for the question, but the tone raised his hackles. The man went on, "Rivers gave this room up half an hour ago. I want you out of here."

Karel's thoughts fumbled around the blank; connected. "Rivers's rent is paid until tomorrow. He told me to stay here till I was ready to go."

"The hell he did. You and your floozy get out of here right now."

Your floozy. The girl was no longer there.

"Where did she go?"

"She took off," said the second man. He looked without favor at the first. "I can't say I blame her."

Karel started for the door. It got out of his way just in time. He tore down the narrow corridor, caroming off the walls a couple of times—something had upset his coordination but there was no time to consider that. *The girl. . . .* He hurtled down the stairs, just managing to keep his balance, and after far too much time reached the dimly-lit lobby below. The girl was not there. He ran out to the street.

Blinking in the brightness he found that the street was empty. It ran in two directions and they were *both* empty. Karel stood in the doorway, dazzled and dismayed. *Two* ways to go. How—

Suddenly he remembered. He turned to the right and started to run—IV/40th Street. He plunged across without stopping to look for traffic, 39th Street. . . . A wild honking

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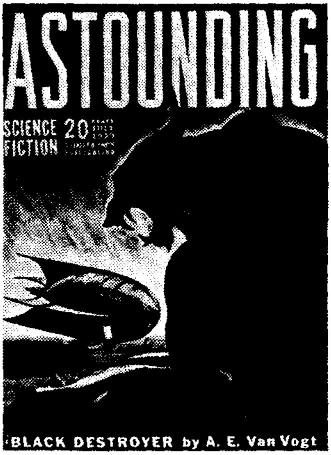

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prevented him just in time from falling under the skirt of a passing floater; the occupants shouted something to which he paid no attention—38th Street.

He came to a halt on the corner, searching his memory. Somewhere here . . . two deer, with locked antlers. . . . Yes, there they were; faded and scratched but still curiously vital. . . . Then a troop of shaggy little ponies. He walked along beside them, remembering. Then . . . a giraffe, with no head. Now it lacked legs as well, but he recognized it. And there. . . .

A sound came from his throat; not a loud one. She was there, with her shoulder-length hair tied by a ribbon, her striding trousered legs, the bow held out behind her, the outstretched hand. . . . But she had lost her flower, and the face under the brown hair had been painstakingly scratched away.

For an intolerably long moment Karel stood there, unable even to shut his eyes. Then the thoughts around the edge of his mind connected up.

This was a *picture*. It was *not* the girl . . . who just happened to look rather like it, or what it used to be. . . . A real girl, who was not here.

On the other hand she was not at 17 East 429th Street either,

That left the rest of Fourth Level. Unless she had taken the lift to Third, or Second, or First; or even topside.

She knew Rivers, or thought she did; or thought he knew her brother. Therefore Rivers might know *her*.

Rivers had gone, too.

The manager at 17 East 429th Street might have a forwarding address.

Standing once more in the lobby, Karel ran his eye over the directory. The word "Manager" failed to catch it. He began again at the top and went patiently through the dozens of names, some with occupations attached, some not. One glaringly white, obviously new strip jumped out at him:

419 James R Delaney. AGENT.

It should have read 419 NAME O.M. RIVERS. He was sure of that, but he looked at all the other numbers beginning with 4, so as to be even surer. Rivers's name was simply not there.

First the girl, now Rivers. Had they ever existed in reality? When Ma Brown sent him on leave against his will, had she known something he didn't? . . . What had really happened to knock him out, an hour or so ago? Or was that episode all part of an extended fantasy, complete with hallucinations?

He thought back to the start of it all. He had walked into an ordinary office room . . . and had been greeted by name by a perfect stranger, a boy dressed like a wealthy grandfather, who claimed that Karel was a telepath too. . . .

And he had *believed* that.

Karel shut his eyes and breathed deeply several times. Then he walked out of the lobby and along the street, from one street to another till he came to a lift. He stepped in and pressed the button for Topside. He arrived in the station then crossed to the Enquiries booth; from there to a stand of public floaters; and went to a ball game.

O.M. RIVERS
Consultant Telepath
17 IV East 429th Street

Hard evidence that he had not imagined the whole thing. Karel surveyed the crumpled bit of paper with angry satisfaction. It had taken him half an hour to unearth it—in the pocket of a tunic which had already been through the cleaner—but there it was.

Thirty-six hours ago he had returned home, exhausted, damp—true to his recollection of Topside, it had rained—and unable to remember whether he had been watching lightball, massball, or Swedish headball, and who, if anybody, had won. He had slept for twelve hours and woken to spend the day dozing in front of the TriV; slept again, and woken with a clear head and a detailed recollection of his first day on leave. Lying in bed and going over it he grew angrier by the minute; also, he had reluctantly admitted to himself, more afraid.

There were two ways to explain his memories. *One*— he had suffered a concussion or a nervous breakdown or a minor stroke, and part or all of what he remembered was hallucination. In many ways he liked that idea least. *Two*—O.M. Rivers possessed not only telepathy but other mental powers, strong enough to have knocked Karel unconscious and rendered him more or less incapable for at least a day. There were aspects of that notion which he liked even less.

What he needed was evidence. He got up and started to look for the advertisement and continued, except for when his mother dragooned him into eating breakfast, until he found the thing.

After the first moment of satisfaction, he admitted to himself that it was not much of a trophy; further, it didn't prove a thing.

He sat down and went over the events, or fantasies, of the previous day once again.

Real or imaginary, his memories of a long conversation with Rivers were clear and sharp, up to the point where he had been smitten with the idea that telepathy could be useful in police work. . . . What it was that happened after that, memory could not express in objective terms; *something* had been done to him that reduced his mind to a state of imbecile confusion. Rivers had done it. Karel felt he would be prepared to kill him rather than have it done again.

Possible course of action—forget about Rivers and hope never to hear of him again.

Strike that.

Alternative course—look for Rivers. The population of Rockwell Deep was only about 400,000 as of the last census. There was of course no guarantee that it now included him. . . .

He was distracted by the sound of voices from the other side of the living room. His mother had switched on the TriV. Glad of any alternative to his thoughts, Karel wandered across to see what she thought worth watching at this time of the morning.

He had the impression that she was not quite so glad of his company as usual; which was explained when the image of a descending spacecraft appeared in the tank. Not, of course, that he would have dreamed of criticizing her choice of viewing material. . . .

The scene changed suddenly to a room that Karel recognized as the Space Field's VIP lounge.

"And this morning," said the commentator, "we bring you an interview with one of the scientists who traveled in the *Giordano Bruno;* Dr. J.J. Jordan, one of the best-known xenobiologists of the Age of Space, who is going to explain the exciting facts behind the *Bruno's* unexpected return."

So that was it. His mother, while more or less indifferent to the findings of space explorers, took a friendly interest in their personal affairs, and J.J. Jordan was a favorite of hers. Not only because he talked, she said, like a *person,* not like some of the space scientists who seemed to think that unless you understood every word of their jargon you had no right to take an interest in what they were doing out there, and on public money, too. . . . Mrs. Karel had also approved of his behavior during domestic difficulties a few years back, when his wife—no, his *ex*-wife—had created an enormous and very public fuss—

Something prickled at the base of Karel's neck. He sat up sharply and stared at the viewing tank, in which a white-haired but by no means old-looking man in a Space Force uniform had just limped into view.

The interviewer was enquiring about the limp, which was apparently due to a broken leg; Jordan was denying that this had caused his return to Earth.

"The expedition's medic did an excellent job of setting it and splinting it and so on. I shall take the opportunity of getting some therapy, since I'm here; but what I've come back for is to discuss a change in the expedition's objectives and to organize some new equipment and personnel. This was intended as a preliminary survey of the whole system. However we discovered that the fourth planet was in the middle of a major climatic upheaval, with conditions changing very rapidly—whole ecosystems going under, many life-forms under threat of extinction. It was agreed that it would be far more profitable to study the planet in depth right now. . . ."

Something about the way he sat—upright and unusually still, none of the fidgetting most people indulged in—nagged at Karel's memory. And his face—just once or twice, when the camera got it at a certain angle—

"Mother," he said urgently, "what was all the fuss about a few years back, when Jordan came back to Earth from some planet—Lamba, I think?"

"That? Poor man, it was really disgraceful. He'd taken his little boy with him—he was able to do it because survey hadn't come under Space Force regulations when his ship took off, that happened while the expedition was away. There was a lot of publicity about it and his wife—his first wife, that is—tried to get custody again. She was really nasty—spiteful—until the husband she'd been married to when Dr. Jordan took off came forward and testified that she'd asked him to take the boy away, because he and the husband didn't get on. That was just spite as well, because she'd gone on to another husband by that time. . . ."

"Yes," said Karel from a tight throat. He cleared it. "You haven't got a picture of the boy, by any chance?"

Mrs. Karel, her son was aware, had compiled a scrapbook of magazine articles concerning Spacer personalities, but it had never been mentioned between them. She produced it now, and riffled through the pages.

"He never posed for photographs, his father wouldn't allow it, but of course they couldn't always dodge. There he is, that's quite a good one. Doesn't look happy, does he?"

The picture was captioned *Richard Jordan, The Boy Who Went To Space, on his way to court.* The boy was O.M. Rivers, several years younger, but unmistakably the same.

PART THREE

Karel sat in a hired floater opposite the house where Richard Jordan lived, and was not impressed. It was a sprawling one-storied affair, mostly windows; so flimsy it was barely adequate protection against the weather. The grounds were a mess. The unmown lawn was full of dead leaves (like the roads and ditches around here. The sad earthy smell of them had accompanied him all the way, once he was outside the lubricating-oil-flavored zone around the up- and down-shafts; with occasional interruptions from farmyard manure and the fuel-alcohol emitted by tractors spreading the stuff. Air topside would give a ventilation monitor the jitters).

To Karel's surprise, Richard Jordan appeared on the voters' list for Rockwell Deep, under his own name. The address was under seal of privacy. Using the precinct computer Karel could have breached it, legitimately, in a couple of minutes; at his personal terminal it had cost him half an hour and several maneuvers which would cause serious trouble if anyone happened to check. . . .

The levstrip branched into the driveway entrance in the usual way. At the entrance the motor died and the floater settled to the ground.

It refused to restart. He tried the alcohol-burning auxiliary motor. It coughed briefly but did not catch.

He took a closer look at his surroundings. Here and there a wisp of air was touched with irridescence, like the ghost of a soap-bubble. The apparent lack of protection was illusory. Richard Jordan had surrounded his house with a force field.

Well, a man as newsworthy as J.J. Jordan would hardly stay in a house where reporters, and the hordes attracted by their reports, could ravage at will.

There must be some way for visitors to make their presence known.

Karel was looking for it when the floater's communicator addressed him.

"If you are seeking admission to this house, please state your name and business."

He recognized the voice, one of the half-dozen standard voders used for domestic appliances. He said "My name is Karel. My business is to talk with Richard Jordan."

Silence. It lasted, by Karel's chrono, for a minute and a half. Then the communicator screen lit up, and an attractive blonde with a serious expression looked out at him.

"Karel? Are you *Lieutenant* Karel, from Rockwell Deep?"

"Yes."

"Oh, I'm so glad! Richard's been trying to get in touch with you all day. He seemed to have the idea you were ill, or hurt. Your precinct wouldn't give him your private code, of course; I think he's gone there now, trying to persuade them to call you for him. I don't know when he'll be back, but would you like to come in and wait for him?"

As Karel stepped out of the floater, the door was opened by an attractive blonde with a serious expression; but this one's head came somewhere about the level of his waist and the fair hair was braided into short pigtails that stuck out on either side of her head.

"Mummy says," recited this apparition in a small, precise voice, "will you please excuse her because the luggage was dusty and she's having a shower, and Daddy says please excuse him because he's got a poor leg, and it's this way."

She took him firmly by the hand and led him along a short corridor to a door whose solidity was in strong contrast to the rest of the house. Behind it a ramp ran downwards along the wall of a long, wide and deep room—or rather a living space which could be divided into several rooms by partitions at present recessed into the walls. A number of doors indicated the existence of other apartments.

The inhabitants, then, had the good sense to live underground much of the time. The exposed upper part of the house would be used when the weather was favorable—when, in short, temperature and humidity approximated those normal in Rockwell Deep, but with bugs and smells added. Still, it all made a lot better sense than Karel had expected.

The room's only occupant was lying on a recliner. Some sort of apparatus, humming quietly, was attached to his left leg. As Karel approached he touched a switch and the sound died. J.J. Jordan looked up and smiled.

"Lieutenant Karel? I'm very glad to see you. Richard ought to be back soon, or at least to call in."

"What would he like to drink, Daddy?" put in the small girl eagerly.

"Nothing for me, thank you," said Karel.

"We've got three kinds of beer and five kinds of wine and Scotch and bourbon and fruit juice and missylanyus lickyoors—"

Jordan, senior, pulled an apologetic face.

"My daughter has never learned to take 'no' for an answer. Better name something; you don't have to drink it if you'd rather not."

Karel yielded to the inevitable. "Juice, please."

"It does orange and lemon and pineapple and strawberry and raspberry, but Ricky says it doesn't taste real, and passing fruit and grape juice," the small girl informed him.

"Orange," said Karel at random.

"I'll have the same," said Jordan.

"Can I have some passing fruit now?"

"No, Two. You'll get a tummy ache if you have any more. When you've given us our drinks you can go and invite Mummy to have one."

She trotted over to the far side of the room, climbed on to a stool, and proceeded to operate the keyboard of a large piece of furniture.

"The previous occupants installed an Auto-bar," Jordan explained. "It's Ellen-Two's favorite thing at the moment. Do sit down, Karel. I believe that chair's comfortable, if you take those packages off."

There were a good many signs of recent arrival scattered around, including a child-sized space suit and several stacks of notebooks. J.J. Jordan and has wife had just got back from a fifteen-month absence; he was having some kind of therapy for the injured leg. The world was full of people who wanted to talk to him, many of them important. He was spending time and cordiality on a fairly junior police officer. Why?

Jordan said, "Have you known Richard long?"

"No, sir. Not long."

"Of course, he only came back to Rockwell a couple of months ago. I suppose you got his message—or one of them?"

"Message?"

"He's been phoning all over the place. Your precinct, Level Two Central, all the hospitals—he seemed to have got it into his head that you'd been injured somehow. I'm glad to see he was wrong."

Karel ignored the implied question. The little blonde was returning, two glasses carefully carried on a small tray.

"Thank you, Two, but visitors first, remember. Now run along to Mummy, will you?"

"Where's Ricky? I want him to play the atom game with me."

"I expect he will, when he gets home."

"Will you play with me?"

"Not now, Two, I'm talking to Lieutenant Karel."

"Is he a Jordybruno lieutenant, Daddy?"

"No, he's a police lieutenant. Go and ask Mummy for the atom game, you can play it quite well by yourself."

The little girl abruptly kissed him, and kissed Karel—who, having a couple of nieces her age, was not greatly taken aback—and departed.

Jordan took a drink of the orange juice and leaned back. "What's happening on Earth these days? Every time I ship out there's some burning question everybody's excited about, and every time I get back it seems to have been forgotten and everybody's fretting about something new. I haven't been home long enough to know the latest one."

"I couldn't tell you." Karel peered into the depths of his glass. "It takes me all my time to keep up with what's going on in Rockwell Deep."

"That'll do for a start."

It was years since Karel had discussed any but the most immediate practical matters with anybody. His colleagues either knew, or didn't care to know, anything that he might have to say; his brothers had their own affairs; his mother, from long practice, could soak up three conversations simultaneously and say "Yes, dear" in the right place to everyone. Perhaps because of this, or because it postponed the awkward question of what to do and say when Richard Jordan came in, or simply because Karel's thoughts and opinions had been banked up for years and he found the elder Jordan a skilled and sympathetic listener, he threw discretion to Disposal and talked, and talked.

"How about a beer, now?" Jordan suggested half an hour later. "Lager for me, please. . . . It sounds to me as though, now that the worst effects of the Disruption have been repaired, several pre-Disruption problems have started to come back."

"That could be part of it." Karel studied the keyboard of the Autobar dubiously; but if a four-year-old could operate it so could he. There was a key marked "Lager"; he pressed it. "But there was one factor missing pre the Disruption that's certainly part of it now, and that's space."

Nothing seemed to be happening. He found another key marked "Pour" and pressed that.

"There were space expeditions before the Disruption," Jordan remarked.

"Yes, but only a real nut would want to go on a Generation ship. The trouble now—"

The glass was full. Foam cascaded over the shelf. There was no key marked "Stop."

"Try that black square on the right," Jordan suggested. The black square did the trick. Karel seized a handful of paper towels from the dispenser and mopped up gobs of foam.

"The instruction panel had had something spilled on it that dissolved the lettering," said Jordan apologetically. "Your last words were 'The trouble now—' "

This is J.J. Jordan I'm talking to.

So what? He asked me to.

"The trouble now, sir, is that space travel has been made to seem desirable. To just about everyone. The best people, the very best people are the ones who get to space. Look at the assessments. If you come out in the top ten-thousandth you're *expected* to apply for the Space Force, and if you don't get in you can't be a success. As for the ones who never had a hope of making it—they're unsettled. They want to get as close as they can; to touch something that's touching it, if they can't do better."

"Hence the people you call spaceheads," said Jordan neutrally.

"Right. But it's not just the kids. Adults aren't settling down to build something, make something of their lives, because they feel it just isn't worth it."

"You think that everybody—or at any rate too many people—feel their lives devalued, because a few have the chance to get off-planet?"

"Yes, I do. If there was any chance *they* might be able to go it would make them think twice. But because there isn't. . . . Look. A few years back there was a rumor that a habitable planet had been found and was being tried out for possible colonization. For a while, there were a lot fewer spaceheads around. But nothing came of it, and now anybody who wants an excuse for not trying to make the best of *this* world has it ready-made—again."

Jordan studied the foam patterns on the inside of his glass.

"That's rather ironical," he said.

"Is it? Space exploration has been going on for thirty years, and all most people have got out of it is pie-in-the-sky and point blank. And—"

"What!" Jordan sat up sharply. "What do you know about Point Blank? Did Richard tell you?"

"Point blank," repeated Karel stupidly. "No, he—No. I don't remember." Something buried in his subconscious was heaving itself upwards, pushing aside various restraints on the way. "He may have said— It's just an expression. Damn it, I don't know why I said that!"

"I do." Jordan leaned back against his cushions, looking very thoughtful. "You're another telepath."

"The hell I—!" More items surfaced in the wake of the first. Karel felt as though he would choke on them. "He did say . . . but it was some sort of trick!"

"If Richard said that you were a telepath there would be no trick involved. He takes it very seriously. He walked out of a research institute, where I'd hoped he would be safe till I got home, just because they didn't take it seriously *enough*. His independent efforts—well, I haven't heard the details, but I can only be thankful they didn't turn out as dangerous as they might have been."

"Damn right," said Karel. The overlay of confusion and of positive rejection was dissolving, exposing memories. Ought Jordan, senior, to be warned about Undershaft and Mungo? No, provided "Rivers" stayed well away from their territory they wouldn't think of him as a danger.

In which they might or might not be correct. . . . He said suddenly, "What's the range of telepathy?"

"You're asking me? . . . Whatever it is that limits reception doesn't seem to be a question of physical distance at all. Richard says that he often fails to pick up a thought from the far side of a crowded room; but I've reached him in the middle of a city-full of people. Other minds can set up interference, but I suspect it's only when he becomes aware of them. Just what determines awareness—"

Karel said in alarm, "Are *you* a telepath?"

"No. Not a trace of reception, which is what counts. Anybody can transmit. Pickup is more likely if the two parties know one another, that's all. As for range; a couple of days ago I called Richard from about three light-weeks outside the Solar System, to tell him that Ellen and I were returning. So far as we could calculate there was no delay at all.... I thought afterwards that I shouldn't have done it: he might have been distracted at a dangerous moment, but—"

I was there. I picked it up too. Karel missed the end of the sentence. *That was when he zapped me with—whatever it was. Because I—because—*

He said, "You were going to tell me about Point Blank."

"Was I, indeed?" Jordan leaned back and looked extremely thoughtful. "Lieutenant, as it happens that is top secret information. Very heavily classified; for reasons I approve, on the whole. Are you prepared to treat it as confidential? Whether you approve or not?"

I might not approve, huh? Karel thought it over. "Yes," he said finally.

Jordan nodded. "Right.... You mentioned rumors about a planet suitable for colonization. There was such a planet, terraformed presumably by one of the Generation Ships. It was labeled Planet C."

"Was?"

"Exactly. It is now... Point Blank."

"You mean..." Karel groped for understanding, "it was destroyed?"

"Not entirely. There is something there, keeping the same orbit, exerting the same gravitational pull. But we can't see it. Energy is neither transmitted nor reflected. Probes launched into that volume stop transmitting and do not return.... One theory is that it's out of temporal phase with the rest of the Universe."

"But how the hell could that happen?"

"I don't know, and neither do the experts. We do know what caused it, though. When this rumor about Planet C was around, did you hear anything about a projective form of the Mass-Time drive?"

"Projective? You mean—something that wouldn't need a ship? You just step through a door or something and there you are?"

"It was never quite as simple as that, but—"

"Stars! You don't mean it was *true?*"

Jordan sighed. "Karel, I watched a man lie down in a metal box aboard a ship. A few minutes later, on a TV screen, I watched him climb out of another box, on the ground forty thousand kilometers below. The time was used in fastening and unfastening the boxes; the projection took seconds. I watched it ten times with ten different men. It was partly a test of the apparatus—the final test; it had been running for months out in the Asteroid Belt. The intention was to use the Projector for the eventual colonization of the planet, and having it tested on the spot was good PR."

"But the way you've described it, nothing went wrong."

"When all the men who were due to stay on the planet had gone down, the Projector was reversed to send others up—the engineers who'd rigged the thing. The first one arrived in the ship without any hitch. When the apparatus was energized to project the second one... the planet disappeared."

Twice Karel began to open his mouth and then realized he had nothing sensible to say. *But planets don't disappear....* He swallowed hard. "And—the people?" he said finally.

"Were still on the planet. One of them was a close friend of mine. Richard's, too."

"Your son—he was with you? He saw this too?"

"Oh, yes."

"Is that why you didn't take him on this last expedition?"

"The chief reason. Regulations have tightened up a lot; but I could probably have swung it, if he'd been willing to come. I asked him—I thought he'd better have the choice —but the idea horrified him.... I'm fairly sure he tried to pick up thoughts from Silas—our friend —after the disaster; Si knew all about the telepathy. He'd certainly have thought of trying to make contact. The temporal dislocation—if that's what happened—might very well have made that impossible, of course. Sometimes I get the impression that Richard feels guilty because he didn't succeed."

Or he might have chickened out. What kind of thoughts would a man have in a situation like that? Terrified, bewildered, maybe dying....

He said, "I should think the people who designed the apparatus felt pretty guilty, too."

"The young mathematician who produced the equations on which it was based was watching the trial. He went off his head."

Karel said suddenly, "But if they'd done all those tests beforehand—"

"The prototypes were tested in the Asteroid Belt. According to the math, local gravitation should have made no difference. The pair used at Point Blank were given a brief test run on Mars, but the series was interrupted by a sandstorm and the apparatus had to be packed up to get it to Planet C at the appointed time.... I gather that quite recently someone's come up with a quantum-dynamic version of the equations which indicates that when operating the Projector in a gravity well the size of Earth's, a disaster like Point Blank could be expected about once in fifty times, so I suppose you could say that Mars Base had a narrow escape."

Karel felt, abruptly, that he had to get away. Too much information cramming into his brain was producing mental claustrophobia. He rose to his feet.

"I'll have to get back now, Dr. Jordan. I'll make contact with Richard another time. Thank you for the beer."

A couple of minutes later Ellen Jordan joined her husband.

"How did it go?"

"All right, I suppose." John Jordan sighed. "Karel wasn't breathing fire when he left, which is the important thing."

"What did Richard do to make him angry?"

"I don't know, but it obviously weighed pretty heavily on his conscience, whatever it was. Oh, lord, Ellen, I never should have gone away and left him!"

"What else could you do? When you suggested crying off from the expedition he was ready to jump down the upshaft. He sets a lot more store by your career than you do. Anyway, he doesn't seem to have done so badly on his own."

"I have the impression he did a whole lot on his own that we haven't heard about yet. Karel hinted that he'd run into some kind of danger at least once. He's the new telepath, by the way."

"The one Rick said he'd botched things with?"

"That one. Damn, I hope Ricky hasn't alienated him for good. He'd be just the kind of friend the boy needs. Oh, you'd better know—I told him about Point Blank."

His wife registered shock. "John, that's Class Z burn-before-reading classified! *Why?*"

"A—he'd got a hint of it already from Ricky's brain, or mine, or both. I thought it would be safer if he knew just what he was dealing with. B—I was trying to cadge some sympathy for Rick. C—I had a phone call earlier this morning from Tom Nakahara at the Gate. The prototype Mass-Time Projectors have gone missing."

"What! But how could they? They must weigh several tonnes."

"They do. But Tom's just been appointed Head of R&D, and he spent last week checking inventory. The two Projectors are listed among the contents of the secure store, and they aren't there."

"It'll be some sort of administrative cockup. They've been transferred to another department and the records filed under the wrong code. You said R&D had gone downhill under Lamartine."

"Not that way. Administration was his fetish. Nobody had time to do anything else."

"But even if somebody wanted to steal the things, and I can't imagine why they should, how could it be done?"

"Oh, it wouldn't be impossible; given an industrial-weight antigrav and a few willing hands on the inside. As for why—well I can't think of any good reason, so it's probably a bad one. You may well be right, and they'll be found somewhere else around the space field; but just in case they turn up in Lost and Found at Rockwell Deep, I feel happier if there's someone around in a position to make a guess at what they are."

Ellen Jordan did not look happy. "That's awfully farfetched, John."

"We've both known things to be fetched farther than that, my love. There's something else, too. Tom didn't call me up just to gossip. He wanted to ask Rick if he'd seen anything of Henri Leclerc."

"That unfortunate mathematician? Isn't he in a nursing home somewhere?"

"He was discharged a couple of months ago and went to live with his mother and sister on the family farm. There was a rumor he'd started work again, and Tom tried to check it out. It seems that five days ago Leclerc packed a kit-bag, sneaked his credit card out of his mother's desk, and took off. Mother's distracted. Three days later his sister also departed, leaving a note to say she'd gone to find him. No destination in the note, but the local journey broker arranged transport for her to Rockwell Deep."

Ellen thought it over. "But the Projectors are the last thing Henri Leclerc would want, surely."

"Yes, but somebody who wanted the Projectors might be very pleased to get his hands on Leclerc. . . . It's not very substantial, and quite likely it will all turn out to be cockups and misunderstandings and none of my business. Something that is my business, unfortunately—another press conference out at the Gate, at 2130 tonight."

"Why on earth are they holding it at that hour?"

"The admiral wants to be present and he's tied up till then. Someone's come up with the bright idea that we returned early to report that things on the Expedition had gone catastrophically wrong. The dread words 'Cover-Up' are being bandied around. The usual sort of thing. At least this time I can deny it with a clear conscience."

Half a kilometer along the route to Rockwell Deep the road widened into a parking place. Karel pulled into it and let the floater settle to the ground. He had a wide view over unspectacular country, ending in a jagged skyline—mountains? Compared with the photomurals along Ninth Avenue, showing the Alps, the Rockies, the Andes and the Himalayas, they were insignificant. He dismissed them, and settled down to think things out.

He was no longer furious with Richard Jordan. Having remembered the events just before he was rendered unconscious he realized that the boy had lashed out in a momentary panic, on knowing that he had been recognized. Young Jordan knew, all too well, the kind of fun that reporters could have with this story—"Space Scientist's Son Claims ESP!"; "The Boy Who Went To Space: Is He A Telepath?" He'd already had a basinful of that kind of publicity; and it certainly would not help his father's efforts to coax personnel, equipment, and funds from the Space Force.

Karel still intended, when he found him, to extract an explanation of the method by which he, Karel, had been knocked out, and to warn young Jordan severely against making a habit of that sort of thing; but he no longer resented it, or at least not much. What he did want, when these preliminaries were out of the way, was to go further into telepathy and the ways in which it could be useful to a police officer.

J.J. Jordan—Karel rubbed his chin thoughtfully. The scientist had certainly set out to soften him up. Well, OK, no caring father would want a police officer pursuing his son with blood in his eye. But Jordan, senior, had spilled far more beans than were necessary for that purpose; Space Force beans. Karel had made it quite plain that he was, on the whole, hostile to spacers. . . . Was there any way that possession of that knowledge could be used against him, if he threatened Jordan's son? For the life of him he couldn't see how.

This was the kind of thing where

telepathy could really be useful. . . .

According to both the Jordans he, Karel, was a telepath.

The thought made Karel blink. There was apparently solid evidence that he had picked up thoughts from both Jordans, several times; but he had been quite unconscious of the process and had no idea how to set about doing it again.

Well, he could only try. He leaned back, closed his eyes, and did his best to open his mind to any thoughts that might be around. He could feel it stretching—he could feel tension somewhere, at least—damn. He was just tightening the muscles of his scalp. He relaxed them.

He thought about Jordan, senior; middle height, middle-aged, white hair, tanned skin—no, that was not the way to do it. What would J.J. Jordan be thinking about right now? The conversation with Karel? . . . His son? . . . Point Blank? A weird and horrible business. Having seen that would account for almost any kind of oddness in a boy. . . . Well, obviously he had been odd enough before that. His family had encouraged it, coddling and protecting him because of his disability. Though evidently he was not so helpless as they thought; when he decided to get away he seemed to have managed it competently enough. Quite possibly he had played up to them, being looked after like a baby so that his mathematical genius—

What? Karel's eyes jerked open. *Who the hell—?* Those were not *his* thoughts—and if this was telepathy he wanted no part of it. He switched on the motor and drove hurriedly away.

Three kilometers down the road beeping began in the storage compartment. Out of habit, he had brought his information plate along. He drew in to the side, fished the thing out, and switched it to "Repeat."

"Noon update," said the contralto voice dispassionately. "On seeing the following, note and report. . . ."

Karel memorized the sequence of faces, each accompanied by notes.

"This young woman was found unconscious in the central garden at Flying Horse Square at 0548 this morning. One-seventy centimeters, slim build, thick reddish-brown hair. No identification." It was the girl who had taken him for Richard Jordan, two days ago.

"What are you doing here, Karel? You're on leave!"

"Reporting on that Jane Doe in the noon update," said Karel virtuously. "Happened to meet her day before yesterday."

The report was true enough as far as it went. Karel stated that he had encountered Jeanne Leclerc, Canadian citizen, in the office of O.M. Rivers, whom she wished to consult about her missing brother. He did not explain what he was doing in the office and made no mention of "Rivers's" other identity.

Karel typed in the last few words and pressed *Dispatch*. Copies went forth to the central computer and its subsidiaries at each precinct. The printer at II/West chattered briefly and spat out a copy. Captain Brown glanced over it, grunted and went on her way.

"What's soured her?" enquired Karel softly.

"Your replacement, shouldn't wonder. Bit full of himself." The sergeant on the computer station glanced at his note-plate. "Someone's been enquiring for you, by the way—name of Rivers." Karel's report caught his eye and he did a double take. "This the one—?"

"I guess so. What did he want?"

"You. Bit young to have an office, isn't he?"

"That would be the son, then. Did he come in person?"

"He did, after phoning twice. Very persistent. In the end I phoned your sett—didn't let him see the code—but your mother was out."

Karel felt guilty over omitting Rivers's true name from his report. It seemed highly unlikely that Richard Jordan could shed any light on what had happened to the Leclercs, and to sic the police on to him unnecessarily would probably put an end to any idea of cooperation over the use of telepathy. But Karel wanted to hear what young Jordan had to say on the matter, and soon.

He went out and called the Jordan house from a pay phone. Richard had not yet returned.

While making his own contribution to it, Karel had printed out the data that had come in so far about Jeanne Leclerc. She had received a heavy charge from a police stunner and had probably been dumped in the garden of Flying Horse Square shortly afterwards. Certainly she had lain there for several hours; and she was not expected to recover consciousness for several hours more.

Possession of a stunner, outside the police force, was illegal, and the penalties were severe enough to make it highly unusual. Jeanne Leclerc must have encountered someone heavily into lawbreaking while looking for that brother of hers.... The surveillance cameras in the Square had no record of her. Nor had those covering the entrance to the Square. Thirty-seven people had visited it during the six hours before she was found, and the same thirty-seven had departed. None of them matched the physical characteristics of Jeanne Leclerc.

So how the hell had she got there? It was easy to see how she had been dumped—the cameras in Flying Horse Square were unsighted for five minutes in each hour; but those covering the entrance were under no such disability. The case officer had probably decided that there was no point in starting an investigation of that question when the girl herself ought to be able to answer it in a few hours. Who was the case officer? Karel took the printout from his pocket... Lieutenant Atabarian. That figured.

Withholding information made Karel feel itchy. There was, he decided, no use in visiting the hospital; but he could go and take a look at Flying Horse Square. He glanced at his chrono. There was time to pick up some sort of burger on the way and be there before 1400.

* * *

Flying Horse Square was not excavated; it was a natural cavern with a stream running through it, lying just to the West of Level II and connected to it by a fissure which had been widened enough to allow two people to pass. Karel walked into it at 1355.

On a weekend the Square would have been full of excited children; but on this Thursday there was only an elderly couple. They had evidently not been told the proper way to do it, which was to keep one's eyes firmly on the garden in the center, until the crucial moment. They were staring at the pool, with its fountains, which lay against the west wall of the cave.

Karel took the path through the gardens. The place where Jeanne Leclerc had lain was still pegged. He did not expect to learn anything from it, but it was something to look at until 1400. He looked, accordingly; until, gradually, taking ten seconds for it, the lights went out

The elderly couple apparently had not been told of this, either; Karel heard sounds of dismay. Then the lights blazed up on the west wall, and there was the Flying Horse, coming down into the pool in a cloud of spray. The lights shone through him as they did through the water, but there was nothing ghostly about him; he seemed to glow with life.

The pool lay in front of a natural buttress, on either side of which the rock formed a deep recess. In normal lighting the illusion was spoiled, a little, by the obvious fact that the Flying Horse was too close to the rock behind him to glide in for landing. The pool lights were so arranged that the rock was almost invisible and the horse seemed to be descending from the night sky.

Karel had seen the Flying Horse a hundred times, but the miracle still worked. His teacher had told him that the Flying Horse was the largest blown-glass sculpture in the world; that if the water-jets under belly and wings were ever turned off it would break under its own weight; that it was a technological tour de force and the sculptor had declared it the end of that line of development and turned to other things. None of which made any difference to the Flying Horse as he came down and came down and came down, wings cupped against the air, hooves tearing the surface, waves curving to break against the keel of his breast.

Pretty good for a glass shell an inch or so thick and filled with air.

Karel turned his eyes away from the lights and gave them half a minute to accommodate. Then he walked quickly to the end of the garden path and struck out towards the west wall. The cavern had been left as far as possible in its natural state; except that the stream had been dammed and contained to form the pool, and the rock behind the buttress cut out to form the pumping chamber from which the jets and the waves were controlled. So far as Karel could see that was the one place where Jeanne Leclerc might have been hidden, until the five minutes of darkness made it practicable to carry her out and dump her in the garden.

Unless whoever stunned her had

the right contacts in Repairs and Maintenance, the magnalock on the pumping station would have to be broken by force.... Close up, the rock of the buttress was dimly visible. Karel went behind it to the right. He didn't even know whether the pumping station door was on that side, but if it was on the left there would have been no point in carrying the girl across to the place where she was found....

Always supposing there was anything in his idea. Probably—almost certainly—Karel was making a fool of himself. He was also trespassing on a case that belonged to Lieutenant Atabarian, which was why he preferred to do his snooping during the time when the cameras were out of action.

He stepped into the deeper darkness behind the buttress... and saw, just, a rough shape of absolute blackness upon the lesser blackness of the rock. An opening—

Something moved inside it. Light hit Karel in the face; died.

"Well, if it isn't my old side-kick Sebastian," Stephen Atabarian whispered. "Come and look at this."

I misjudged him. Damn.

Karel stepped into the opening, cautiously, expecting a space bruisingly full of machinery. Instead he found himself in a narrow passage with a distinct upward slope. Atabarian had turned his flashlight on the floor and it seemed to go straight on as far as the light reached.

"What is this?" said Karel softly.

"Don't you recognize it?"

Karel's mind made a quantum leap. "The Slave Factory? It's supposed to be sealed off!"

"This entrance wasn't recorded."

A faint lightening of the floor suggested that the main lights had come on again in Flying Horse Square. Then the tunnel bent to the right, and only the ellipse of the flashlight remained.

"Who found it?" Karel said.

"I did."

"Sure. Take a bow." *He really has showed us hicks up, and how he loves it.* "I meant, who found it first? Who's been using the place? What for?"

They had reached a point where the tunnel branched into two. Atabarian turned, and aimed the flashlight at Karel's face. Behind the light he raised one hand in a gesture which Karel saw, dimly. He had a sudden feeling of danger behind him, and whirled, hands going up; but something paralyzed him, for a disagreeable moment, before it knocked him cold.

Somebody was crying, and trying hard not to; a difficult, muffled noise, punctuated by the occasional hiccough. There was no way of seeing who it was; no light. Karel listened, briefly inert, before it occurred to him to take steps. That was when he discovered that a stunner had been used on *him*. He lay still until the tingling receded and he could think again of going to investigate.

His left ankle was tethered to the wall.

Karel felt round the band on his ankle—smooth, not uncomfortable, but a snug fit. A cord led to a shapeless blob stuck to bare rock. He knew the stuff; had used it, from time to time. No getting away, until someone came with a degrip.

He wondered whether Steve Atabarian was also a prisoner.

No he didn't. Thinking back, the son of a bitch had led him into this. On purpose. Dammit, the fellow had admitted it. *Who found it? I did....*

Karel swore, loudly; forgetting the person who was crying, until the sound stopped.

"Who's there?" he said. "Sorry. I wasn't swearing at you. Are you tied up as well?"

Silence. then "I-I-I-Aya-Ya...." A gulping sound. "I-I-I...."

He was shut in with an idiot. Or...no. He'd heard that sort of thing before. Once. A really pathological stammer.

He tried again. "My name's Karel," he said, and waited.

No answer, but he heard movement. A faint clinking. The feeling of someone close by. Then cold fingers touched the back of his hand, and something was pushed into it. A cup, wet on the outside and—as he discovered gratefully—full of water.

"Thanks," he said. "I needed that. You're not tied up, then?"

"N-n-n-n." A pause. "No."

"How long have you been shut in here?"

A pause. Then the sound of a clap, followed by two others.

"Three days?"

One clap.

"What the hell is that loony playing at?—Is there any plumbing here?"

Sounds of movement. The cord attached to his ankle twitched as a hand ran along it. Karel's elbow was taken in a tentative grasp, he was assisted to his feet and steered a couple of steps, to what his nose told him was a chemical toilet. Gratefully he made use of it. He made his own way back to where he had been lying, on some sort of pad. Camping mattress?

So the place was all set up for prisoners. Or maybe just one prisoner.... He said "Are you Henri Leclerc?"

"Y-y-y-y-" The sound broke off. One clap.

It was a frustrating way to make conversation. Karel tried to think what he should ask next. He needed another guess. What did he know about Leclerc? His sister had been looking for him. Well, Karel knew what had happened to her.... She thought he had been looking for Richard Jordan. Why? Of course. With a stammer like that—

He said, carefully, "You know Richard Jordan. Does he put your thoughts into words for you?"

A momentary outbreak of yammering; then one clap.

"I can pick up thoughts, sometimes. Try thinking to me. Slowly. Try to tell me how you came here."

A long silence.

"Look—*were* you trying to think to me?"

One clap.

"Hell. I suppose I'm not on your wavelength." Karel thought, hard. He had tuned in on J.J. Jordan—at least he thought he had—by guessing what he would be thinking about and shaping his own thoughts to match.

"Henri," he said. "Think about

. . . an animal. Any one you like."

What would he pick? A dog? Did he have a dog? Or a cat? Cows, sheep, horses, hamsters—

A wolf. Grey, hungry, separated from his pack. Howling for loneliness.

Karel blinked.

"A wolf? Was that what you were thinking of."

Clap.

"Right. Well . . . think of it again, for a minute or so. Then think about what's going on here. All you know, as clearly as you can."

Wolves get hunted and killed, all for nothing. It is not true that they kill farm animals, or not often. Most of the time they hunt small vermin—mice and rats. The men here think they have found a way to get to other worlds. It was used, once, but it went wrong. It is very, very dangerous. The machine was used on a world far from our Sun and now—how will I make him believe it? The others would not. They risk rotating the Earth out of this Universe, but how could I make anybody believe that—"

"Godalmighty," said Karel, "is this about that bloody Projector thing? Point Blank?"

For a time it seemed that Henri Leclerc had gone into orbit and was never going to come down. Whether it was relief at being understood, or remembered terror at the mention of Point Blank, Karel could not make out. He broke into a yammering attempt at speech which sounded as painful to utter as it was to hear. Finally Karel managed to get him to sit down and breathe to a slow rhythm, until he seemed relatively calm again.

"Right," said Karel. "You feeling OK now? Let's start again. Think about the wolf—make it a nice tame wolf lying down asleep. Then—"

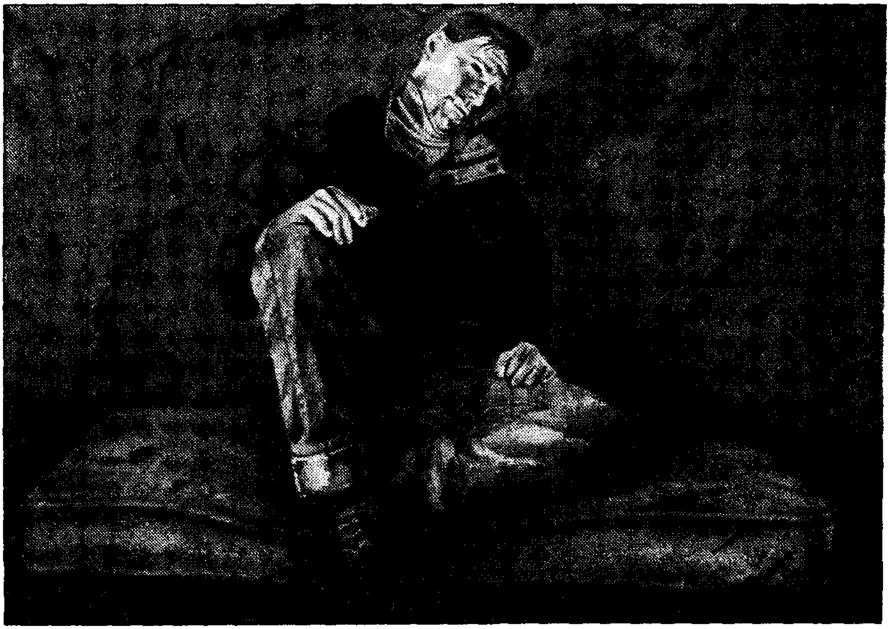
There was a ponderous grinding sound, as of a rock door being opened by manual controls; then the slap of footsteps. Faint reflections of a moving flashlight. Then a ceiling light came on.

Once his eyes had adjusted, Karel saw that it was by no means brilliant; enough light for a walk-in closet, spread over a very large room. Shadows cast by a very bulky object in the middle of the space cut down the illumination still further.

Two men in coveralls were carrying in various things that clattered metallically when they were put down. They ignored Karel and Leclerc; Karel suspected that they were taking some trouble to pretend there were no prisoners around.

Henri Leclerc was revealed as tall, thin, with a shock of hair whose color Karel could not make out in the dim light. His clothes were well made; three days' continuous wearing had not rumpled them much. He came over and sat beside Karel on the mattress, not too close. For a man who had been virtually climbing the walls not long ago he moved surprisingly well.

Dragging noises and the sound of something that rolled puzzled Karel; then he translated them into heavy cable being unwound from a drum. A sudden glare on the far side of the bulk indicated that they had brought



a heavy-duty lantern along.

Karel whispered, "How much power does it take to operate the Projector?"

He felt Leclerc shudder, and wondered if he was going off into another fit of nerves. However the thin man arranged his fingers in a K, then a W; then opened and closed both hands five times.

Fifty kilowatts. The Slave Factory had been run off a generator with half that power; a big clumsy thing that filled the whole place with the stink of fuel. Whatever provided the lighting in here had no smell at all; an oxyhydrogen cell, probably, putting out a hundred watts if that.

The proton monopile originally installed in the Annex had been removed fifty years later. A backup system already existed, equipped to draw power from the mains in the Deep City at the throw of a switch. The cables were still intact, sealed in argon-filled ducts.

When the place was rediscovered there had been a group in favor of dismantling the system, but it had been defeated. Instead, alarms had been inserted at several points, to give notice if it was switched on. The Annex in working order could be invaluable in the event of various unlikely but not impossible catastrophes—

Stars, one of those could be in preparation right now, and the Annex wouldn't help a bit. What in hell did these people think they were doing? The Projector needed a receiver; where had they put that? Getting the

thing down here must have been a very considerable job. Come to think of it one of the entrances to this place was within the perimeter of the Space Field, and the Projector was still sitting on what looked like an antigrav pallet, and evidently it hadn't been impossibly difficult, since the thing was *here*—but no way could they have got one of those onto a spaceship.

Karel wondered whether to question Leclerc further; but the technicians, despite their careful lack of attention to anybody who happened to be unlawfully detained nearby, might have felt compelled to take notice if he did. Could he eavesdrop on their thoughts? Probably right now they were entirely taken up with connections and voltages.... How about Steve Atabarian?

Karel tried to decide what Atabarian was likely to be thinking about. Where was the bastard, anyway? He glanced at his chrono—1648. That stun blast must have put him out for quite a while. If Atabarian wanted to avoid trouble with Captain Brown he would need to phone in collected data at least once an hour, which couldn't be done from the Annex, so—

Leclerc made a sound of alarm, very softly. Karel looked up. Question answered. Atabarian was here.

He was not a particularly big man, but seen from a sitting position on the floor he loomed against the light in a manner that could be alarming. His first words were not particularly reassuring.

"Congratulations, St. Sebastian. You've got your dearest wish and ditched my career."

Then he laughed. "What the hell, there's a better one coming up. Old Lady Brown can put out all the calls she likes. If you hadn't stopped me getting through the Square during the dark period I'd have kept her happy a bit longer, but so what? Tomorrow I'll be a hero, my old man'll be in the government, everybody will have forgotten I ever was a cop."

"They won't forget two counts of kidnapping, misuse of privileged information, breaking official seals, theft of Space Force property—"

"Chicken shit. Karel, do you know what this is?" He gestured towards the object in the center of the room.

"One-half a pair of things called Mass-Time Projectors."

Atabarian was visibly taken aback. "How the hell—? You mean *he* told you? How long did it take him? He's been a great disappointment to me. Not just that goddamn stutter. I thought he'd be behind us all the way, but when I told him what we meant to do he freaked completely—"

"What *do* you mean to do?" Karel kept all but the mildest interest out of his voice.

"Isn't it obvious? I suppose he never managed to tell you the rest."

Atabarian stooped to bring his gaze to bear on a level. His voice went soft.

"There's a planet, Karel, Earth-like, terraformed by one of the Generation Ships. The goddamn Space Force brass are keeping it to themselves. All the real estate any of them could ever use, and *this* is how they'll get there." He dealt the Projector a blow with his fist. "*This* was developed years ago—that white-livered specimen beside you had a hand in it, which is why I thought he'd be useful—but it's been put under wraps. Man, it's the answer to everyone's prayer—the way to the stars in minutes, instead of months. No ship needed, except to take the receiver to the destination; you just get into the box and bingo! You're there. How do you think the public's going to feel when we give them *that?*"

"Give them?" said Karel. He had no particular difficulty in keeping his voice cool; his emotions had cut out from overload.

"Let them know it exists, and they'll damn well *take* it. There's a press conference tonight out at the Gate. We shifted the pair to this beauty in the Press Room a week ago—under a cover, of course—a thing that big, everyone assumes it's part of the furniture. When the conference is in full swing, a man is going to be transmitted there from here."

Leclerc screamed "No-o-o-o!"

"Oh, be quiet, dummy," said Atabarian irritably. "The thing's safe. It was tested a hundred times. More."

"In the Asteroid Belt," Karel said, and was surprised to hear his voice so calm. "It was tested in a planet's gravity well exactly twice—no, three times. The fourth time it didn't move the man, it shifted the world he stood on. That planet just isn't there any more."

He was suddenly aware of silence

on the far side of the projector. So was Atabarian. He strode back there and discussed the work in progress, loudly, for a couple of minutes. Then he came back.

"You've been brainwashed, Karel, like this washout here. How do you know what happened? Were you there?"

"No. I had an eyewitness account."

"What, from Leclerc? He's been off his head for years. Got the papers to prove it. He'd believe anything he was told to. I'm ashamed of you, Karel. Call yourself a cop? What about evidence?"

"Well, where's yours?" Karel recognized Atabarian's tone; that of a man who had his own theory and meant to stick to it; but he just might shake the technicians a little. "Where did you get this stuff about the tests?"

"Eyewitnesses. Like you. We've got friends at the Gate. Oh, not in the bloody Space Force, naturally. Workers. Technicians. The people who clean up after the *real* Spacers. Two of them actually got to go along on the Asteroid tests, because they knew more about the equipment than anybody else. They saw what it did, and they saw it being stuck away in storage and were told if they ever mentioned it they'd get the sack. But they weren't going to be intimidated. They knew it belonged to the people whose taxes paid for it, the people who were being cheated out of their rights!"

"Stars," said Karel, "there was a rumor your family was into politics, but I always stuck up for you. Said it was the other kind of garbage they dealt in. Looks like I was wrong."

For a moment he thought Atabarian was going to hit him, and got ready to seize his arm and break it. Then the other man laughed, returned to the technicians, spoke with them briefly, and finally went away.

Shortly afterwards the technicians finished their job. One started to go, turning in the doorway because his companion had left his tool bag and was making his way towards the other side of the room.

Instinctively Karel got to his feet. The technician, a stocky middle-aged man, came to a halt in front of him.

"I ought to knock your block off, smartass," he said thickly; then tramped back to his tool bag, picked it up, and went. The door ground shut.

At least they hadn't taken the light away. Karel kept coming back to that. They might be going to banish the whole Earth into some other dimension of time, where it might or might not be within reach of the Sun; but for the moment at least there was light.

He pushed the thought out of his head and tried for the third time to come up with a way of escape. If he could lure somebody within reach, and if that somebody happened to have on their person a degrip for the restraint on his ankle . . . he could then try to open that door and take his chances on police stunners and whatever other weapons might be at the disposal of this bunch of lunatics, while trying to make his way through an unknown number of branching tunnels, to a door which would in all probability be firmly shut.

Put that way....

The alternative was to yell for help. Telepathically.

He turned to Leclerc, crouched beside him.

"Listen. If you want to call Richard Jordan, what do you do?"

Leclerc straightened in obvious astonishment. "C-c-c--c-c?"

"Yes. If you want to send thoughts to him, how do you start?... All right. The wolf. Start with that."

Wolf howling... I just thought and he spoke what I was thinking.

"Oh. He had to be with you? You never called when he was far away?"

Leclerc shrugged and spread his hands out... of course. What good would that have done him? He could not have made pickup on the reply.

So. Try to raise Jordan, from cold. What was he likely to be thinking about, at this moment?

Well, I know he was trying to get in touch with me.

Richard Jordan, this is Karel. Singing song for Christmas, remember? You've been trying to reach me. I need help. Try to call me now.... Jordan, this is Karel. Christmas songs. We had a long talk two days ago. Are you making pickup? Mayday. Mayday....

What am I going to tell him if I do get hold of him? Jordan. Mayday. This is Karel. Are you making pickup? The essential thing is that the Projector's been stolen. I have to make him believe that. Jordan. Karel here. Come in, please. Your father told me about Point Blank. A bunch of lunatics are all set to cause that right here on Earth. Karel here. Are you picking me up?

Have to stop this, I'm not giving him a chance to reply. Jordan. This is Karel. Singing—

"Damn you, answer me!"

The blow landed on Karel's ear. He reacted fast, seizing the forearm and beginning to twist; but the sitting position was too much of a handicap. Atabarian kicked him on the elbow and broke free.

He backed away, looking startled and angry. Karel got to his feet.

"What the hell was the matter with you, just then? You looked as daft as he is! I spoke to you three times and you just went on swinging your head from side to side like a bloody scanner. You going off your head?"

"What did you want to know?" snapped Karel.

"What the hell you were playing at when you butted in here!"

"Looking for traces of the bastards who zapped Jeanne Leclerc."

He had forgotten all about Jeanne Leclerc's brother, who started to his feet, stammering distressfully.

"It's all right, Henri, she wasn't badly hurt—she's in hospital, sleeping it off. She was looking for you and I suppose she ran into this hero here—that right, Steve? You added stunning women to your list of achievements?"

The final question proved to be a mistake. Leclerc flung himself on Atabarian, screaming, and was violently repulsed. His head hit the wall with an audible crack and he landed half on the mattress and half on the floor, unconscious.

Karel knelt beside him. Leclerc's pulse and breathing were steady; which was no proof that he had not cracked his skull.

"Bloody lunatic," said Atabarian. "Who put you on to snooping, Seb—Old Lady Brown?"

"Far as I know, she hasn't got on to you yet. Hadn't then, at any rate. I was just curious. I'd met the girl—"

"Yeah, I read your contribution. What were you doing in an office on Fourth Level?"

"Minding my own business." Probably he ought to have another try at convincing Atabarian of the danger attached to the Projector. The chances of success were about one in a thousand, if that—

Karel. Karel. Christmas songs. This is Rivers. We met in fourth level. I know I owe you an apology but please do not break off. Karel, your captain wants to speak to you and your mother is worried. You should phone her as soon as you can—

Stars, what timing.... Atabarian was looking at him very oddly; Karel wondered just how he had reacted, physically, to that contact.

"Get out, Steve," he said. "You've acted like a lunatic and what you're doing is incredibly dangerous for the whole world, but you'll never consider believing that. You're too far in. Go and dream about becoming a public hero; go and do it somewhere else. You make me sick."

If Atabarian had been carrying his stunner, Karel thought, he might have used it at that point. His hand did go to his holster, but that was empty. Presumably he had lent the stunner to someone who might need it for a use more urgent than stifling criticism.... He turned and tramped out.

Karel. Please respond. Captain Brown just phoned again and your mother is really anxious

Karel here. Rivers, this is urgent. Top urgent. Can you hear—I mean, are you making pickup

Rivers making pickup.

Stars, there's too damned much.... I saw your father today. He told me about Point Blank and the Mass-Time Projector. The Projector has been stolen. It's somewhere in the Annex where the Slave Factory was. The lunatics who stole it want to project a man into the other half of the thing—that's somewhere at the Space Field.

Karel. Slow down. Check. A Mass-Time Projector has been stolen.

Check. Yes.

It is in the sealed-off tunnels used for the Slave Factory.

Check.

Someone intends to use it. When?

Tonight. There's a press conference at the Space Field—

They will project someone at the press conference at the Space Field tonight.

Check.

How do you know?

They kidnapped me. The man I told you about—the one I don't like—he's involved.

Why did he kidnap you?

Bloody hell, thought Karel, shocked, he doesn't believe me.

Rivers, I know it's a lot to swallow, but—

Why did he kidnap you?

Karel tried to put his thoughts in order. So damned much. What were the essentials?

First he kidnapped a man called Henri Leclerc. How did you put a name clearly in telepathy, especially when it was not one you could make puns on?. . . . *He had something to do with designing the Projector. He has a godawful stutter—"*

Blurr

Not clear.

Never mind. Cancel.

His sister came hunting for him. Tried to find you, found me. You remember—

Check. Continue.

She was picked up unconscious this morning. Found in Flying Horse Square. I went there snooping around. There is an entrance to the tunnels behind the Flying Horse. Right-hand side. Ran into Atabarian. The man I don't like. He used his stunner on me.

For a heart-stopping thirty seconds he thought the contact was lost.

Karel, shall I tell your mother about this?

Hell. No. Yes. Wait. Tell her I've come across something urgent and you have to report it to Captain Brown. Tell her I'm OK

Thirty seconds' pause.

She doesn't believe that.

Tell her I'm not hurt but I'm a prisoner. I'll soon be rescued. Tell her this is urgent police business and not to interrupt. She'll understand.

Leclerc made a small, whimpering noise. Karel bent over him. His eyelids fluttered briefly and were still.

Karel. What else should I know?

That was a hell of a question.

The other Projector is in the room where they hold press conferences at the Space Gate. Some of the technicians and cleaners are in the plot.

They would have to be.

Right. Check. . . . The whole thing's political. Atabarian talked about the right of the people to have access to the planet that got blanked. His father's in politics. Captain Brown knows about that.

Check. Rivers signing off

"Damn it, wait!" Karel shouted it, and knew as he did so that he was in the wrong. The important thing now was for Rivers—Jordan—to get the information immediately to someone who could act on it.

If they believed it. If they were prepared to swallow that a nineteen-year-old boy had received the information telepathically from a lieutenant of police who had been sent on leave, allegedly suffering from fatigue, and had listed among the baddies a person he was well known to dislike. . . .

Some of it could be checked, Karel told himself. The door in Flying Horse Square must be detectable if one knew where to look. By this time it must be known that Jeanne Leclerc's brother was missing and that he had worked on the Mass-Time Projector. Presumably the Space Force knew where the Projectors were supposed to be and could check that one was missing; also that the other was in their Press Room.

On the whole, though, the checkable part didn't come to much. Not enough, probably, to convince Captain Brown's superiors of the need to mount a major operation, at top speed, in the maze of the Annex. They might convince themselves after a day or two investigating, but by then it would be too late. Much too late.

Of course, Earth might be lucky, as Mars had been. According to the calculation J.J. Jordan had quoted, it was even likely.

In which case the existence of the Mass-Time Projector would be spectacularly demonstrated in front of reporters from all the main news programs. There would be an immediate demand for it to be brought into full use, the public would have to learn about the catastrophe of Point Blank; panic, outcry, public turmoil; attacks on the World Government—

Maybe not all that. At the very least the officials at the Space Gate would probably shift the damned Projector away from the place where the conference was due to be held.

Always supposing Rivers could get to somebody with sufficient authority, quickly enough—

Leclerc made a small moaning noise and raised one hand feebly in the direction of his head. There was an egg-sized swelling at the back, under the thick hair. Karel looked around quickly for the source of the water Leclerc had given him earlier, ashamed not to have thought of it before. It turned out to be a ceramic bucket with a dipper on the side, just within his tethered reach. He dragged it towards him and dipped out a cupful.

Leclerc was unable to sit up and much of the water got spilled over his face and neck, but it seemed to revive him slightly. His eyes opened a little and he made a vaguely interrogative sound.

"You cracked your head on the wall. Just lie still," Karel said.

Shortly afterwards the light dimmed, then went out altogether. Presumably the fuel cartridge in the generator was exhausted. A shortage of power equipment might explain why the room containing the Projector was also used as a prison. If all their equipment was being brought in via the entrance inside the Space Field it would be limited to what they could lift from the Space Force; no way would they be allowed to carry unexplained packages through the perimeter gate.

He was strongly tempted to call Richard Jordan and find out what he had achieved so far; but he remembered how the arrival of Jordan's call had distracted him at what could have been a dangerous moment, and was afraid to try. Instead he tried to make pickup on Atabarian, without success, so far as he could tell—unless Steve Atabarian was thinking about food, a subject which invaded Karel's mind more and more frequently as time went on.

What ought he to think about, when the world might be about to end? His family? Karel thought, and was overwhelmed by a burning anger at the incredible, fatuous, unnecessary stupidity that threatened them all; his mother, his brothers, their wives and children . . . all the people he knew, all the people he didn't know. Thanks to Steve Atabarian, and his idiot followers, they could find the world rolling under them into some unimaginable limbo, cut off from time and space and the light of the Sun; his three nieces, seven, five and four years old, could—

With a wrenching effort he detached his thoughts from that possibility. He needed to keep a cool head, so as to watch for any least possibility of getting free. If he could lure Steve Atabarian, who presumably had the degrip for the plastic fetter, close enough, he could grab him by the arm and ram his self-centered head against the wall again and again until—

That wasn't going to do any good, either.

Start again.

Karel, you don't know me. Remember that. You don't know me.

What in blue hell—? Karel's pulse shot into high. He waited for further communication, but nothing came. He fought down the temptation to call Rivers; that could be disastrous. . . . Time passed.

The grinding of the manual control announced that the door was being opened again. A narrow fan of light invaded the room and began to spread. When his eyes had accomodated to it Karel recognized the effect of a flashlight in the corridor outside. He heard swearing, and instructions to get a fresh fuel cartridge. The door opened widely enough for the flashlight to shine straight into Karel's eyes. He blinked. Leclerc, whom he had temporarily forgotten, raised himself on one elbow, was caught in the glare, and shouted. With pain? Alarm? There was a certain amount of confusion; then the new cartridge was put into the generator, the main light came on, and the flashlight was put out. Three figures advanced into the room; two of them holding the third between them.

"Look, I got to get back home! I gave you Mike's message, I don't know any more about it!" The voice was young, indignant, and slightly frightened. The owner, when he got close enough for Karel to make out details, wore the standard uniform of a teenager not under immediate parental supervision: frayed pants, faded tunic, and a decal on one cheek representing a skull.

For someone who had spent most of his adolescence off-Earth, Richard Jordan was doing rather well.

"The coordinator wants a word with you, that's all," said one of the men placatingly. "He won't be long."

"But I got supper here for my brother and sister. Bought it on the way." He hefted a plastic container. "If Mom gets back and they're still hungry she'll *kill* me!"

"Just shut up, kid, and sit down there." The second man had decided to take a hand.

"Well, it's the last time I do Mike a favor, I'll tell you *that.*" Jordan sat down with a thump on Leclerc's vacant mattress and seemed to see the huddled form of its owner for the first time. "What's up with *him?*" he demanded in frightened tones.

"He got a bang on the head," Karel

said. "He's confused. He needs a doctor."

"He can have one," the first man said. "Later. You'll all get what you ask for, later. For now, we've got more important things to think about."

They waited in silence for perhaps a minute. Footsteps outside announced Steve Atabarian. He strode over to the boy and stood looking down at him for several seconds.

"Mike Kanouris sent you with a message," he said finally.

"Yes, he did!"

"So what is it?"

"I told *him* already. . . . Oh, all *right*. Mike said to tell the first person I found that the press conference had been postponed till 2230. That's *all*."

"Who told him that the press conference was postponed?"

"His boss, I guess. Mike looks after the Press Room. Like, he's the janitor. So he'd have to know."

"And why did he send you? Why didn't he come himself?"

"Well, he'll have to stay at the Field till it's all over, won't he? To clean and lock up. That's his job."

"I just tried to call him at the Field. He didn't answer."

"Maybe his boss gave him something else to do. The Press Room isn't all he looks after. Most of the cleaning staff will be off duty by now."

"*Where* did he give you the message?"

"He came by our quarters. My Dad works out at the Gate, too. He's Mike's cousin."

"I didn't know Mike Kanouris had any cousins," said the second man suspiciously.

"Course he has. There's my Dad and two of my aunts, their mother was Mike's mother's sister. And his father's brother—"

"Never mind." Atabarian glanced at the second man, who shrugged.

"I don't know him that well, I guess."

"If your mother told you to look after your brother and sister, why did you agree to carry the message?"

"Well—look. Mike kind of figured I owed him."

"Why?"

The boy seemed very interested in his own hands.

"My big brother drives a floater. He parked it outside the quarters and—well, I thought I'd try it out. I mean, those things, they aren't *supposed* to run into anything, only there was something wrong with the repulsor and—well, Mike knew it was me, and he didn't tell. So I guess I did owe him."

"And how did he tell you to get in?"

"Through the back wall in the janitors' closet. He gave me *this*." The boy stretched out his hand with some small object in it. Atabarian took it.

"I see."

"He said if I held it next to the wall it would slide open, and it did. Hey, I got to give that back to him! If I don't he'll skin me alive!"

"I'll give it back to him, in due course." Atabarian slipped the thing into his pocket. "I'm going to check with Lundy about the press conference," he said. "Stay here, Mario."

The man with the stunner leaned

back against the Mass-Time Projector. The other one followed Atabarian out.

"Hey, look, I got to get home!"

Nobody paid any attention.

Ten minutes later the second man returned and summoned the other with a jerk of his head. They left, leaving the door open.

The boy got to his feet irresolutely.

"Don't try it," Karel advised him. "You won't get away."

"Guess not. They took my key. This is the *very* last time I do Mike a favor. . . ." He wandered over to the door, then came back and sat down.

"One of them's out there," he muttered.

Did you ring Captain Brown?

No, I—

WHY NOT?

I called Dad. He rang her, but he called Space Force Security first.

That made excellent sense.

Did they believe him?

Of course. All they had to do was go and look in the Press Room and find the Projector. They'd been hunting it for three days already.

An enormous weight rolled away from Karel's mind.

So they switched it off. It does have to be powered, doesn't it?

The man outside walked in and gave them a long, suspicious look. Then he went back, and the door ground shut.

Could this place be bugged?

Karel thought briefly. "No way." There had been no reason to do it before he arrived, and no opportunity since.

Richard Jordan stood up and stretched.

"I really did bring some food," he whispered. "I thought you'd be hungry."

He opened the plastic box and handed Karel a sandwich.

"What the hell did they send you here for?" muttered Karel. "And what's happening? Have they switched the Projector up there off?"

"No—"

"Stars' sake—!"

"They couldn't do it in time. The Projector's been bolted to the floor in the Press Room. They think the power pack and connections are underneath it, but there's a force-field round it. They think that must be on a time-switch or maybe it'll go off when the coffin—"

Suddenly Jordan shuddered.

"—When the box that does the traveling is exchanged. They can't get at the Projector through the floor, because that's half a meter of concrete with dirt right underneath."

"So what the hell *are* they doing?"

"Rounding up enough security men to come in through all the entrances to this place and stop the Projector being used. They reckon they'll have to arrive in force and without warning to make sure Atabarian doesn't use it as soon as he learns they're on the way."

Karel's relief had been premature. He stiffened his mind against renewed terror.

"What did they send you ahead for? Are you reporting back to another telepath?"

"No, there isn't one available. Nobody sent me. I just came."

"You did *what?*"

"I thought you'd want to know what was happening. And I did hope there wouldn't be any way they could check the time of the press conference, but they've managed to fix up an extension from a phone at the Field."

"You mean the time *wasn't* changed? Atabarian will—"

"No, he won't. The conference nearly was postponed at one point, because they thought the admiral was going to be delayed. Whoever Atabarian's calling will know that.... I didn't really think I could delay him using the Projector, but the message made a good excuse to be here."

"Who's Michael Kanouris? And how did you get into the Annex?"

"He's one of three people with access to the Press Room key. Security got on to him straight away, because the records showed he'd used it a lot more than he was supposed to, last week. They dosed him with veratrine and he spilled all he knew. He had a key-button like the one you showed me, and I had that one in my pocket. I didn't know if it would work on the door in the back of the janitor's cupboard, but it did."

"You sneaked off and your father doesn't know where you went to? *He'll* kill you, never mind your Mom! What did you do it for?"

"Dad had gone off with Tom Nakahara. I asked someone to tell him I'd gone home.... I don't *know* why I wanted to come here! ... Yes I do. I *saw* it. Point Blank. I saw a whole planet disappear, with Si Waterman and all those other people on it. I *couldn't* just... hang around, waiting."

Karel noticed that he was holding a ham-and-lettuce sandwich. His stomach reminded him forcefully that it had been empty for a good many hours. He took a bite and changed the subject.

"How did your father convince Space Force Security to act on information you got by telepathy? I would have thought—"

"Yes, so did he. So he told them you'd called him on the phone. He said you knew him because you were a friend of mine, and when one of the... the conspirators broke down and told you all about it, you called him so he could get someone at the SpaceGate to check the Press Room. He told your captain you'd said you were going in search of Atabarian, to ask him about Jeanne Leclerc, and you were supposed to call Dad again but you hadn't."

Karel thought back.... "I didn't tell you about Jeanne Leclerc."

"No. Captain Brown told Dad. Jeanne woke up and told them she'd found a letter sent to Hal from Atabarian, and she arranged to meet him in Flying Horse Square, and she couldn't remember what happened after that. So Captain Brown was looking for Atabarian rather urgently. She thought you might know where he was—that's why she called your home—"

That reminded Karel, "How did you come to be with my mother, f'godsake?"

Jordan looked down.

"I was trying to find you. I wanted to apologize for . . . what I did to you. And to find out if you were all right, but the sergeant at the precinct told me you were."

"How'd you get my address? Telepathy?"

"I got your code number that way. The sergeant called your mother for me. She was out, but I made pickup on the code. I just kept calling it till she got home, and then she said I could come around and wait for you."

Karel and his brothers had tried repeatedly to convince their mother that the old days of safe, casual hospitality to perfect strangers were now over. . . . He thought of something else.

"That thing you did to me in Rivers's office—"

Jordan sighed. "I really am sorry about that."

"Never mind that. Could you do it again?"

"No!" Jordan swallowed, hard. "Look—in the first place I don't really know how I did it. I was just trying to . . . sort of lay a smoke screen of other ideas, so you wouldn't make pickup on who I was. Only then you folded up and fell off your chair, and— But anyway, I couldn't do it to anyone except a telepath, and none of this lot are."

That seemed to be that. Karel had another idea.

"Is there any way we could put this Projector out of action? Unscrew something, maybe?"

"It doesn't look like it," Jordan said. The menacing bulk in the middle of the room had a brutal solidity and simplicity of outline. Any delicate or unscrewable parts were probably well protected. All the same—

"Maybe Leclerc could do something to it, if we could bring him round," said Karel dubiously.

"Leclerc? Stars, is that him lying there? What happened to him?"

"Hit his head on the wall."

"Yes, well, I don't suppose he'd know what to do, anyway. He just did the math for the Projector, not the engineering."

The door rumbled open again and three men entered: Jordan's former escorts, and another, older man in lab overalls. They had brought a powerful antigrav pallet with them. This was parked beside the Projector while one of them fiddled with things on the far side. Suddenly the lights quadrupled in power.

They've switched through to the mains. They're getting ready to go.

Atabarian made an entrance. He spoke softly to his followers, then walked over to the prisoners, stunner in hand.

"You'll be glad to hear that the press conference is now back in its original time slot," he said to Jordan. "So you'll be home with your loving family an hour earlier than you might have been."

"Mom'll be home first," Jordan muttered.

"Well, with any luck she'll have been watching a newscast about a truly historic event at the Space Gate, and you'll be able to tell her you witnessed it from the inside."

A long metal box had been coaxed out of the Projector on to the antigrav. The three men lowered it to the ground and unclamped the lid. Jordan shivered and turned his head away.

"Who's your guinea pig?" said Karel abruptly.

"Thinking I might volunteer you, Seb? Don't worry. I'm going myself, of course." He stepped closer, though not close enough for Karel to snatch the stunner, and said softly "No speeches, if you want to stay conscious. The operator's nervous enough as it is."

Had there ever been a one-in-ten-thousand chance of talking these idiots out of using the Projector? Probably not. Karel glanced at his chrono, 2103.

Where the hell was Space Force Security? Where were the Rockwell Deep Police?

The man in the lab overalls was testing the life-support systems in the metal box. The coffin, Jordan had called it. Steve Atabarian was planning to have himself shut in that thing, loaded into the Projector and fired through the mass-warped continuum. He couldn't check on the condition of the receiver, he couldn't know for sure that the journalists he wanted to impress would be present. . . .

I hate his guts, but at least he's got them.

It was now 2114

"When do you want it activated?" said the man in overalls abruptly.

"ASAP after 2130. The reporters will all be there even if the speakers aren't. If Admiral Te Kawa enters to the sound of horns and the flashing of lights—well, it'll teach him to be punctual next time."

"Rigged the receiver with alarms, have you?" Karel whispered. "Suppose they don't go off?"

"There's a backup in the shape of an inquisitive reporter, primed to enquire into the mysterious machinery. Kind of you to worry, Karel, but I don't plan to suffocate—bad publicity."

The lab man had gone behind the machine, and by the sound of it was operating a keyboard there. Jordan was sitting with his eyes closed and his lips pressed tightly together. Making pickup on somebody? Trying some other mental trick?

Where the hell were Space Force Security? The police?

The lid of the box was raised again. Steve Atabarian handed the stunner to one of his companions and climbed inside. The lab man made some fidgetting adjustments to things within, lowered the lid, and clamped it in place. The antigrav pallet rose slowly until it was level with the cavity of the Projector, and the box was pushed inside.

It was 2127

One time in fifty—disaster. This could be the one time. WHERE THE HELL IS CAPTAIN BROWN?

The lab man was standing with his eyes on his chrono. Sweat all over his face.

It was going to happen. Karel found himself on his feet, tugging furiously, futilely, at the tethering cord. It was going to happen and he was about three meters away and couldn't do a single bloody thing—

The lights went out.

Somebody screamed. Somebody else yelled furiously for quiet. Suddenly the light came back—the comparatively weak light powered by the small generator. It showed Karel one of the men running for the doorway, then running almost as fast backwards as the broad opening filled with people in uniform. Two from the Rockwell City Police—one of them Captain Brown—and two in the charcoal-grey of the Space Force.

"We told 'em to cut the power thirty seconds before 2130," Captain Brown was saying. "We were using the output emanation to home in on the bastards; didn't want to lose it too soon."

She was in the living room, but Karel, slumped on a stool in the kitchen, heard her without difficulty. Captain Brown was on a high; partly from triumph, but mainly from relief. Entirely on her own responsibility, she had detached every available man, leaving Precinct II/West in charge of a single officer, in order to cooperate with the Space Force. The chief of police was at a conference in the capitol, and his deputy at a mayoral dinner. She had covered herself as far as possible, recording messages to both; the trouble was they would know that she *could* have made contact—if she had been willing to spend half an hour arguing with intermediaries.

So her neck had been stuck right out. If anything had gone wrong she would have been lucky to keep her job—always supposing the world was still a place in which jobs had any meaning.

In any event the raid had been a complete success. Captain Brown was now socializing enthusiastically with the Space Force's top brass, just as though she did not habitually refer to that organization as the Starhopper's Joyriding Club. It had occurred to Karel, watching her farewells to the Space Force contingent as they set off through the tunnels with the lion's share of the prisoners, that he might not hear her call them a bunch of anti-social fund-hoggers ever again.

Just how his home came to be full of Space Force personnel, Karel had not enquired. Probably his mother had issued a general invitation while Richard Jordan was using her phone, and it had occurred to somebody that the sett had important advantages as a venue. It seemed curiously appropriate that the preliminary postmortem on Steve Atabarian's exploits should take place here. When Karel's father was alive, and his brothers still at home, any sort of special occasion had ended with the participants flocking in to relive the highlights over coffee and cakes.

Watching his mother dissect a chocolate ring, it occurred to Karel that she probably missed all that. Certainly she was in her element now, with the big coffee-maker in action and a month's supply of baked goods defrosted. Her enjoyment had something to do with the fact that one of her guests was her favorite television personality and another wore possibly the best-known face on the planet, but not too much.

Karel rubbed a hand over his face. There was a serious ethical problem to work out, and not much time for it. He was in possession of information that the Space Force wanted to keep quiet, and any moment now J.J. Jordan and Space Admiral Rui Te Kawa were going to ask what he proposed to do about it.

When Jordan told him about Point Blank there had been no problem. Whatever Karel's feelings about the Space Force and the right of the people who paid for it to know about major cockups, not only had the information been given to him in confidence, but it would have been pointless to spill it without evidence to back it up. Now, however, the facts about Point Blank had become part of a big complicated mess involving, among others, the son of an influential politician. Karel was going to have to put in a report on his part of it. He didn't actually need to mention Point Blank, but it would take some careful editing to leave it out. And what was Steve Atabarian going to say? Whether Karel explained why he had thought it so extremely urgent to prevent the use of the Projector, or left it to be assumed that he simply wanted to put a stop to an assortment of illegalities, including his own kidnapping; the facts about Point Blank might well be part of the world news quite shortly.

Then what? Confidence in the Space Force would take a knock. Hell, it would be hammered flat. Millions of people who dreamed about space would start having nightmares instead. The influx of spaceheads into Rockwell Deep would come to a halt.

So why hesitate? That was what he wanted, wasn't it?

But how about all the people who were not spaceheads, but for whom space—or rather a new habitable planet—was the ultimate goal, if not for themselves then for their children; who wanted, in the tradition of most of the human race, land they could call their own? What happened when the props were kicked away from a goal like that? There was a theory, with a certain amount of fact behind it, that the ultimate cause of the Disruption had been a general loss, not just of hope but of things worth hoping *for.*

Karel sighed. It was the sort of problem that ought to be slept on, but he wasn't going to get the chance. For one thing, some time within the next couple of hours the space admiral was going to ask his intentions; for another, his room, like the rest of the sett, had been taken over by the Space Force.

He rested his head on his hands and tried a mind-clearing exercise. Presently he was distantly aware of Captain Brown's voice raised in a series of boisterous farewells, culminating in the sound of the front door sliding home.

When he looked up he found J.J. Jordan standing in front of him.

"Sorry to disturb you, Lieutenant. Are you all right? You got a dose of stunner, didn't you—?"

"I'm OK."

Karel had been taking a shower when the Space Force contingent arrived and had kept out of the way since. It struck him that Jordan was looking rather worn himself.

"Could you come and talk to the admiral for a few minutes, then?"

There were two men on guard in the hallway. They had cups of coffee in their hands—anybody allowed into Mrs. Karel's house became a guest—but they contrived to look very official. Karel expected to find the living room rearranged as for a conference or even a court martial. Instead it reminded him again, and strongly, of the impromptu get-togethers after a family event. There was even a uniform jacket lying temporarily disowned over the back of a chair with a matching hat on the seat; only instead of his father's workaday blue these were charcoal-colored with insignia in white, and gold braid on the collar and the peak of the hat. The chairs were all bunched at the far end of the room, where a handful of people were drinking coffee and discussing something, with gestures.

Sitting on the sofa and eating cake with evident enjoyment was a thin brown-skinned man in uniform trousers and a short-sleeved shirt. He swallowed the last mouthful, put the plate down and held out his hand.

"Lieutenant Karel. It was extraordinarily kind of your mother to allow us to use your home for this meeting. There are some things that should not go on the record until they have been sorted out, and it would be far harder to arrange that on official premises."

Everybody calls it a mask, Karel thought, accepting the handshake, *but they've got it wrong.*

Te Kawa was famous for the landings on Titan and Ganymede, and for bringing the *Tycho Brahe* back from the abortive voyage to Barnard's Star, after faults had developed in the retemporation system, and for being appointed admiral as a compromise when two strongly backed candidates were opposed equally strongly by other groups in the Assembly of Nations; but most of all for his tattoos. There must, it occurred to Karel, be other descendants of the short-lived NeoMaori movement still around; but maybe their parents could not prove descent from sufficiently important chiefs. Whatever the truth of that, the marvelously executed pattern of curves and scrolls that covered every inch of the admiral's face was apparently unique. It was generally considered to make his expression unreadable. Karel thought that, even without the tattoos, Te Kawa's face would never be read unless he chose to permit it.

"I understand that, sir."

"Good. Can you find somewhere to sit? Tell me about Atabarian. Is he a friend of yours?"

"No, sir." It came out more sharply than Karel intended. "I worked with him for a couple of weeks, three years ago. I hadn't seen him since."

"What sort of man is he?"

Karel chewed his lip for a moment, then embarked reluctantly on an assessment that was cautious to start with but became franker as he recalled various things that Atabarian had done.

"In short," said the admiral as he ground to a halt, "clever, plausible, ambitious, vain, cocksure, manipulative, and unreliable."

"Hell, you could rely on him for *some* things. He had guts—*has* guts. It was just—things had to be done *his* way." Karel thought of amending that to the present tense; gave up. Face it, Steve Atabarian was finished, at any rate, as a cop.

"I was quoting the account of the Space Force PR officer responsible for giving Atabarian access to parts of the Field; allegedly so that he could collect data for a Ph.D. He also was reluctant to speak. He felt that it reflected badly on his common sense, since despite his opinion he made only the most cursory check on Atabarian's activities. He was right."

"So that's how he got hold of the two technicians who worked on the Projector," said Karel. One small problem solved.

The admiral sighed. "Yes. They ought, of course, to have been told what happened. Almost everybody else from the team that tested the Projector in the Asteroids was lost with Planet C. It was agreed that Point Blank should not be publicly discussed, and it did not occur to anyone that those two had a special and particular interest. They had been sworn to secrecy when the tests ended—we were going to have enough problems when the Projector was publicly announced, without a lot of premature rumors. They had kept their oaths, but when they discovered that the work had been shelved, without any reason given, they drew very damaging conclusions.

"Apparently Atabarian had a theory that disaffected employees might provide him with useful information. He learned that those two were thoroughly unhappy—something which their supervisor should have noticed."

The design on the admiral's forehead had changed shape. He was frowning.

"I'm surprised you managed to keep Point Blank quiet, with so many witnesses," said Karel bluntly.

"You were one of them, John," the admiral remarked.

Jordan sighed. "Yes . . . Karel, everybody on all three ships was deeply involved with the exploration of Space; it was a condition for being there at all. We all agreed on a policy of silence. We also agreed, every one of us, to submit to moderate conditioning; sufficient to prevent the matter being mentioned unless there was a very good reason."

Karel opened his mouth then decided silence *had* better be his policy also.

"You have to understand," Jordan went on "that nobody had any idea *why* it had happened. We were all afraid of the kind of panicky revulsion that could be set off. There was a real and strong risk that all work on the Projector would have to stop; and that would put an end to any hope of reversing what had happened and bringing back Planet C."

Karel sat up sharply. "You think that's possible?"

"What I think isn't evidence; I don't understand twelve-space math or engineering based on it. People who do claim to be close to a testable solution. If it tests out the planet will be back. The men on it—that depends on their powers of survival, and just what they've had to survive."

"You could get the kind of reaction you were talking about, this time, if Steve shoots his mouth off," said Karel slowly.

"Atabarian will be charged with kidnapping and assault, and will plead guilty," said the admiral with authority.

"Yes, but—"

"He also stole and attempted to operate an experimental machine, abandoned because it induced a dangerous degree of instability in its surroundings. That charge will not be pressed, provided he agrees to accept conditioning against any mention of its existence. He will not want to go on trial as the man who put Rockwell Deep at risk of, for example, a major earthquake. The actual risk, of course, was a great deal more serious, but I see no need to explain that. Do you?"

Around midnight the visitors started to leave, quietly. The first batch had been using the room that used to be his elder brother's. Karel encountered them while returning from the bathroom, and recognized a congresswoman with a record of opposition to Atabarian Senior; one of the men with her had a secretarial look, the other was a captain in the Space Force's legal division.

The next group emerged from Karel's own room. He heard someone saying goodbye to Mrs. Karel, followed by a recognizable attempt to do the same, from Henri Leclerc.

Leclerc, Karel thought, was a lot tougher than he seemed. Or maybe he was simply able to withdraw from almost any threatening situation, into his own universe of thought, which, being chiefly mathematical, had no room for threats. . . . According to the medics he had not been seriously concussed; probably he had been conscious most of the time, but had preferred to keep quiet about it. Why not? There was nothing he could have done. . . .

Captain Brown had taken charge of him—he obviously expected it; probably somebody always took charge of him. On the way from Flying Horse Square she had stopped the floater at the hospital and demanded that he be given a head-scan immediately. Leclerc submitted fairly willingly to that—no cracks detected.

She had then sent him, much against his will, to visit his sister. He had insisted on Karel's company and support.

Jeanne Leclerc in a hospital gown bore no resemblance to the White Lady. Karel had found the metamorphosis of the gallant and free-striding figure he remembered into a haggard, disheveled woman who scolded her brother like a shrew, curiously upsetting. But then, burdened with a brother who combined mathematical brilliance with an almost willful lack of common sense, and a mother determined to exact her full share of attention, in a narrowly circumscribed community at the back of beyond, it was understand—

Hold on.

A rapid memory search confirmed that nobody had told him anything about the Leclercs's background. So how—?

Had this sort of thing happened to him before? Not that he could remember. Perhaps contact with another telepath had some sort of catalytic effect.

He looked up, and found himself eye to eye with the telepath in question.

Richard Jordan had had no chance to change his clothes, but despite the teenage outfit—even the skull on his cheek was still recognizable, though rather the worse for wear—he looked his true age, or somewhat older. More mature, at any rate.

"I need to talk to you," he said gravely. "It doesn't have to be now, if you're tired. Your mother says I can stay the night. Do you mind?"

"Hell, no. I want to talk to you, anyway. Were you interpreting for Leclerc?"

"That was the idea, but after a few minutes he and Major Nakahara just wrote equations to one another and I didn't have to."

"Nakahara knows you're a telepath?"

"No, he thought we were using sign language. Henri waves his hands a lot. Nakahara thinks the evidence for telepathy is all a fake. That's going to be difficult, I suppose. . . ."

"Why?"

"Well, he's head of Research and Development, including Project FarCry. That's the section that investigates claims to have produced a method of interstellar communication. According to regulations they have to do a proper check on *all* claims, however unlikely, but—"

"Hold on a minute," said Karel, startled. "Are you saying what I think you are?"

"I expect so. . . . Telepathy does work over interstellar distances. Dad proved it. Of course, it needs a lot of working out, but—"

"You don't want to go back to space! You're afraid of it!"

Karel realized as he said it that this came under the heading of Things That Might Be More Tactfully Expressed. However, Richard was too deep in his thoughts to feel insulted.

"That doesn't matter. The important thing is what Major Nakahara told me—there's a chance they may be able to reverse what happened at Point Blank and bring the planet back. One of the things that's holding them up is communications. It takes six weeks for a fast courier to bring back observations and another six to carry suggestions out—not to mention equipment and so on. Actually it's a lot worse than that—they can't send a ship every time there's something to report. If we could organize—"

"Hold on. *We?*"

Richard Jordan sighed. "I know you don't like spacers. I wouldn't ask you to go to space, or to give up a lot of your time. But I need somebody to help me with the first part—demonstrating that it really will work."

"What about all those telepaths at your Esper Institute?"

"They wouldn't be any good. Not at this stage. They might join in later, when things have got started. But none of them has enough nerve, or enough *sense*, to help get it going. Once I've convinced Nakahara and the admiral, they'll set up a worldwide hunt for telepaths, and anyway it won't be so tough. But at the beginning there'll be a lot of skepticism. A lot of hostility, even—because people like Nakahara don't *like* the idea of telepathy, it really upsets them—so to get anything started I'll *need* somebody like you."

Karel sat back and considered him carefully. Wash off the decal, comb his hair, put him back in that expensive and ultra-conservative suit he had been wearing when they first met (Why? In the mistaken belief that it made him look older?), Richard Jordan still would not look like the man to put an unheard-of proposition to the space admiral and his head of Research and Development, and make them like it.

Of course, he was his father's son. That turned the inconceivable into something that just might have a one-*in-a-hundred* chance of getting off the ground.

And he really was a quite genuine telepath.

And Jordan senior's message from a ship light-weeks, if not light-years, away from Earth really had arrived.

And Karel was on leave. Captain Brown had *sent* him on leave, saying he needed a change. She might expect him to return, since his substitute had been so dramatically taken out of service; but the leave was official and not to be cancelled without his consent.

And Richard Jordan had made his way into the Annex partly to let Karel know what was going on, and had thought he might be hungry, and brought him a sandwich.

And whatever the kid was planning would be a damned sight more interesting than a ball game.

Karel took a deep breath, let it out again.

"We'll talk about it in the morning," he said.

"He's a really nice boy," Mrs. Karel said, putting the last of the coffee cups in the drainer.

Karel agreed.

"All that fuss about him a few years back—The Boy from Space—it could easily have turned his head; but no."

Karel closed the cupboard door and waited for whatever was coming next.

"Celia Brown told me something she maybe shouldn't have done. It was confidential."

"Maybe you shouldn't tell me, then."

"That Atabarian boy put in for space training—he was assessed high enough, but they turned him down."

Karel had a sense of things fitting together. To suppose that Steve Atabarian had been seeking to avenge himself on the Space Force for failing to appreciate his worth would be popular psychology at its least subtle; but—yes, it fitted. They wouldn't have him, so he tried to get the dirt on them. . . .

"Did you ever wish you'd gone to space, 'Tian, when you had the chance?"

"No, Ma, I didn't. When I heard I'd been accepted, that was when I knew I wanted to stay here. . . . And anyway, I might have been dropped before I ever got on a ship. Plenty of trainees are."

"Not you," said Mrs. Karel with sublime conviction.

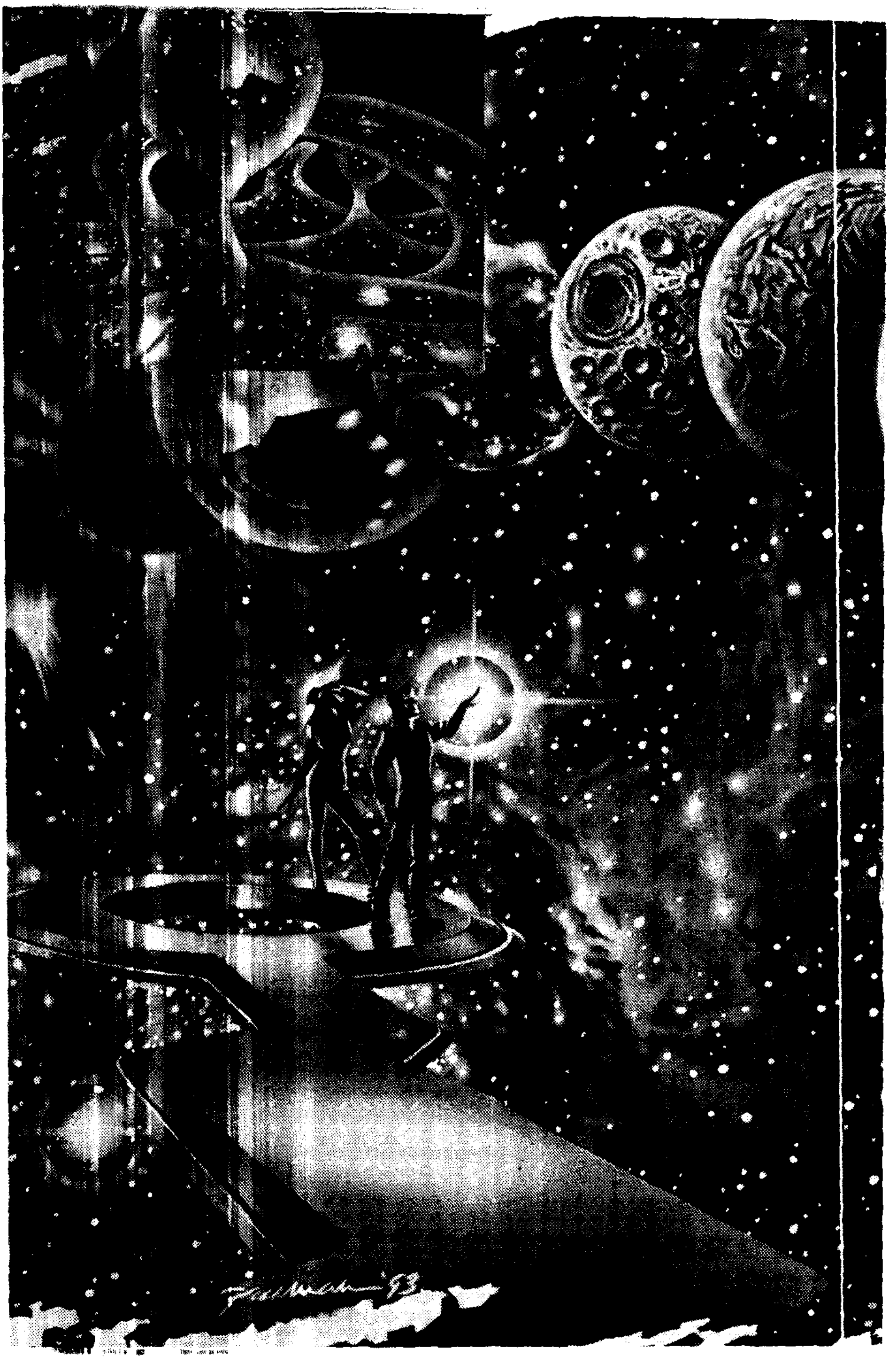
It wasn't exactly true, anyway. There had been a time when he wanted to go to space as fiercely as any other boy in his class. He *might* have applied for training just to measure himself against the others assessed one-in-ten-thousand; but that was not the reason. Not really. Then, when he heard that he had actually been accepted—

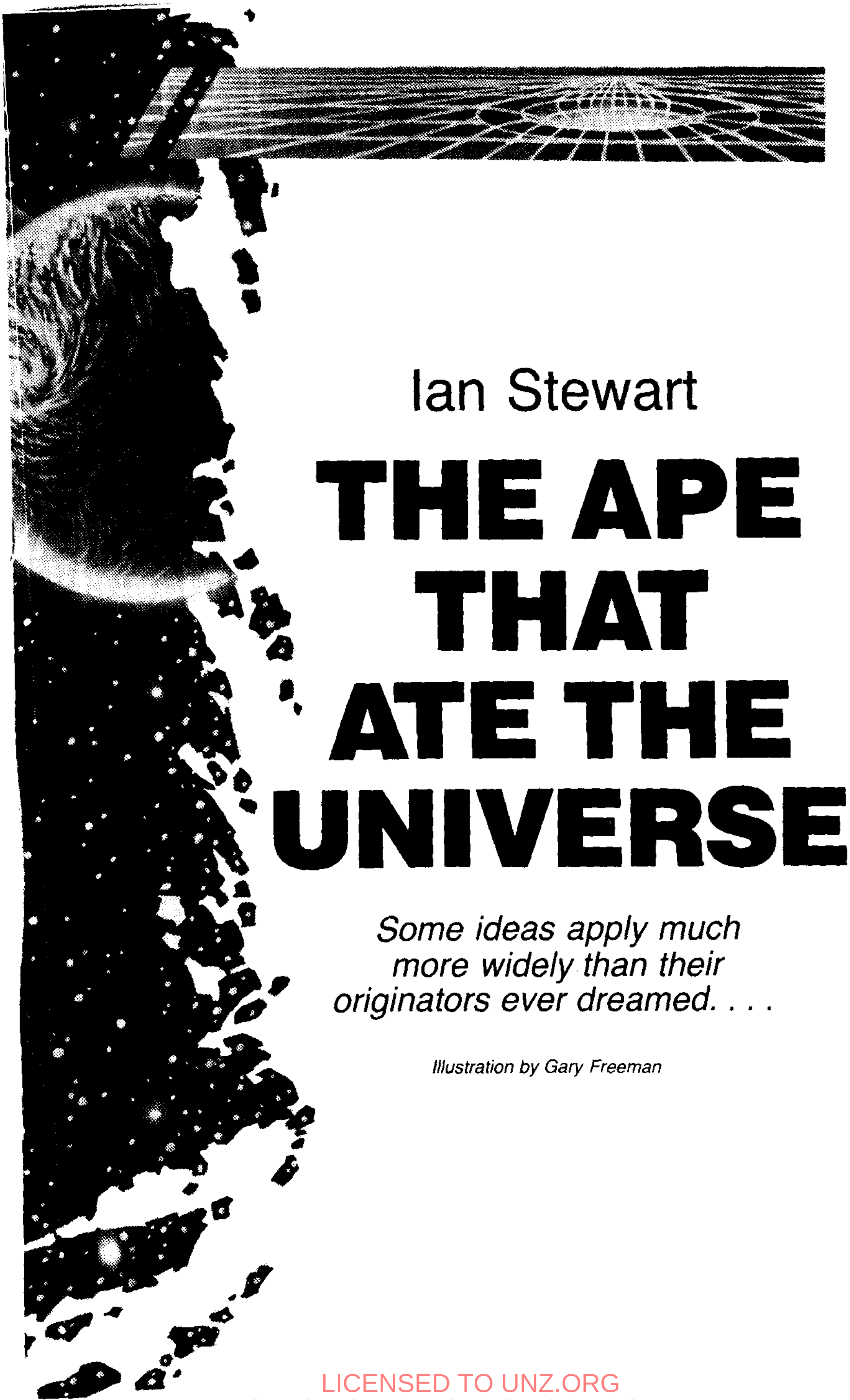
He wasn't going to desert Earth, just when the effects of the Reconstruction were beginning to fray at the edges; desert Rockwell Deep just when three hundred years of law and order were starting to break down. . . .

Some people would say he was getting a second chance. He knew a little about Project FarCry; the people in charge were nothing if not thorough. Fairly certainly, if he agreed to Richard Jordan's scheme he was going to find himself whisked off into space at some point, to undergo the most stringent tests they could devise. . . . A second chance. He hadn't asked for it, he wasn't sure that he wanted it, but there it was. . . .

He kissed his mother goodnight, and went to bed. ■

> Posterity is as likely to be wrong as anybody else.
>
> Heywood Broun





Ian Stewart

THE APE THAT ATE THE UNIVERSE

Some ideas apply much more widely than their originators ever dreamed. . . .

Illustration by Gary Freeman

The planet writhed in torment.

For the second time in ten thousand years it had been sterilized—its oceans boiled off and collected in orbital tori for later replacement, its mountains razed and tumbled into the canyons left by the evaporated oceans, its atmosphere blown away, easy to regenerate, not worth collecting. It had been worldformed by the Others when their expansion wave smashed through this part of the galaxy; now it was being terraformed by the Sphairarchy. To the victor goes the soil.

It spun in space, a mottled spheroid, as the rays of its sun scoured away and last remaining traces of proto-life—DNA fragments and more primitive organics dissociating in the hard radiance.

Now the first step towards its resurrection would begin. A symbolic act, the laying of a foundation stone.

A new orbit, and a name.

In the eternal darkness between the stars floats the cause of it all, the hub of the wheel upon which the planet is being broken. Such a tiny speck, but complex beyond belief, powerful beyond imagining. It is Worldchanger.

Start from Worldchanger's skin, and go down, peeling off layer by layer: view-ring, command and control, supplies, public services. Six layers down you will find Lissabith Icemoulder Coldstream Leapfrog, an athletic brunette whose mind is normally razor-sharp but needs frequent time-outs. Right now she is all of a dither as she chooses what to wear for the christening. Another layer takes you to a cocoon containing the personal effects of Jarret Loommaster N'Djamena Glizard. Jarret, a squat little man with a nasty but very efficient mind, is currently seated in a hold-area in the second layer, awaiting details of an urgent reassignment.

Eighteen layers inwards from Worldchanger's skin, a solitary figure floats in his cocoon. His pathname is Martival Memekeeper Kwathumba Cooroo, but his friends call him Marty. He is tall, but he tends to conceal his height by adopting a slight stoop. He wants to make an impact but would prefer not to attract attention. The memes that he keeps are mostly about gravitic technologies, but he has a sideline in ancient theories of evolution, a specialty that has little bearing on practical terraforming. He'd been desperate to get into space, and the opportunity laws had provided an opening. He'd applied for Halfway and been given Worldchanger.

Marty is a fish out of water.

But then, so was Eusthenopteron, *and look what came of that. All the land animals on Earth.*

Lissabith Icemoulder Coldstream Leapfrog, who preferred the macro "Lisbit," was waiting for her aerogel to deliquesce. She tripped into VR-mode for a nonEcom conference with her friends, light-years distant. She needed to be complimented on her appearance, and her friends would always—oh, no! The Organizer was reminding her that the non-Einsteinian communication system was temporarily down; something to do with maintenance. Oh well, the effect, she was sure, would be devastating. Assuming, of course, that she could persuade Marty to down his implants for long enough to notice. Poor Marty! Anyone who felt guilty about tearing planets to bits was out of place on *Worldchanger*. Most of the 'formers found it impossible to talk to him, so he kept a low profile, spending his time messing about inside the vessel's Organizer. Jarret said Marty was a closet Prissie. But Jarret always exaggerated.

She flicked at the edge of her hair and it rippled, but it was still too springy. She tripped into VR mode and inspected the back of her head twenty times life-size, checking the alignment around the roots. Marty did have some strange ideas, though.... Air-jets removed the fluid layers left by the vanishing gel. She flicked again at her hair, studied the effect. Perfect! Time to go get Marty, make sure he opened up a bit, enjoyed himself.

She knew exactly how to find him.

Marty had long ago configured his virtual-reality implants so that the Organizer manifested itself to his senses as a vast, ancient library, stocked with tapes and optic disks, its benches crowded with equally primitive reading machines. A dozen layers down, he browsed through archaic texts ...and dreamed. Nobody ever listened to him, not even Lisbit. Not really listened. They'd have to if—well, to be brutal, he admitted privately, if he had anything worthwhile to say. He dreamed of making a major discovery that would turn the Sphairarchy inside out. *Worldchanger* was the wrong kind of environment—the leading edge of the Sphairarchy's obsessive destruction of everything associated with Others. He had to keep reminding himself that over a hundred billion human beings had died in the Other Wars, and even then he found the attitude hard to comprehend.

Mostly he dreamed of a transfer to Halfway. Yes, Halfway was the place. He hoped Jarret would approve his request, if only to get rid of him.

Marty asked the Librarian to bring him a document. He was enormously proud of his Librarian. In virtual reality it manifested itself as a squat, furry creature, a bit like a beaver, but with paws deft enough to manipulate virtual objects. "Your request is actioned sir," it growled—not very clearly—as it passed him a virtual tape-cassette.

"Thank you, Minerva." Marty refocussed his thoughts on the document.

"*...for us all organic beings are striving, it may be said, to seize on each place in the economy of nature, if any one species does not become modified and improved in a corresponding degree with its competitors, it will soon be exterminated.*" The ancient language possessed a quaint elegance, and Marty had become used to its archaisms.

"Burying your head in the Organizer again?"

He looked up. "Hello, Lisbit."

"Lisbit-analog."

"Naturally. How else could you

have come inside my virtual library? Meet Minerva." He pointed to the furry beast. "My Librarian."

"It's *cute!*"

"Thank you, Madam," said the Librarian, construing the remark as a compliment. "I am merely a VR construct."

"It *talks!*" squealed Lisbit in surprise. "Oh. Of course. You gave it a speech module."

"Minerva's a she," said Marty. "No, I didn't. I thought it would be more fun if she was allowed to evolve spontaneously. Artificial life."

"We did that stuff in Organizer appreciation classes," said the Lisbit-analog. "A self-replicating data-string and a radiation bath for mutations. Natural selection rose spontaneously from the competition for memory space. It was *wild.* At first we just got billions of copies of the ancestral program. But then everything began to take on a life of its own."

"Starting with a parasite," said Marty.

"Yes. It positioned itself next to a replicating string and hijacked the code to copy itself—How did you know?"

"Any evolving system develops parasites. As soon as you get a lot of copies of one organism, it pays a simpler one to steal some of all that free complexity. Think of viruses parasitising bacteria, trypanosomes living in the human bloodstream . . . stockmongers in the market. About one insect species in five lays its eggs inside those of another insect species. *One in five!*

"There are universal patterns of development. You get immunities, hyperparasites, multicelled architectures, predators—parasites on a different level—right the way up to social creatures, communication, and intelligence. It's the same in all evolutionary systems, from artificial life to society."

"Why are the patterns the same?"

"The word is complicity. Complexity and simplicity, each feeding off the other. On a sufficiently abstract level the game is always played by the same rules."

"And Minerva?"

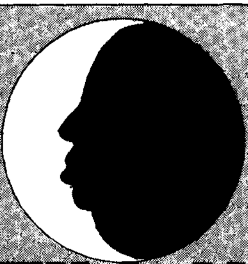
"She started out as an experiment. . . . But the programs had access to standard modules. One of them blundered into a dictionary, and a few thousand generations later it learned to represent itself in virtual vision. Since then Minerva has gobbled up a lot of other useful attributes. I wouldn't be without her."

Lisbit remembered why she'd tripped into Marty's VR-environment. "You promised to take me to the party. Do you like my hair?"

"Yes . . . nice." *Party? Oh,* that *party.* "Place-and-Name. Sorry, Lisbit. I lost all sense of time."

Lissabith Icemoulder Coldstream Leapfrog shook her head, and the vitual bells projected into her halo played random fragments of music. "The truth, Marty, is that you don't really like parties."

In fact what Marty didn't enjoy was the heavy doses of EEs that most people required to be social. *The truth is that I don't really like myself. A brilliant start for changing the universe.* He smiled apologetically, muttered a



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banal rebuttal, and reluctantly downed his implants.

First, a Place. The Others had evolved on a planet of a blue-white star, in an eccentric orbit that exaggerated the seasons. During the blazing summer they encapsulated themselves inside spore-coats to conserve moisture. In autumn they shed those protective coatings and conceived new lives. They hibernated in huddled groups throughout the bitter winter, as the new lives diversified within the group hosts. With spring the newborn joined the group, and the cycle repeated.

They were highly intelligent and had colonized half the galaxy before they ran into an even meaner organism. Even then it was a close-run thing.

The planet's average temperature was close to human norms. The variance was not, it was far too extreme. A new Place would be supplied, a circular orbit, with seasonal variability provided by a modest axial tilt.

Marty ignored the proffered EE capsules as Lisbit dragged him through the heavy crowds. The atmosphere was charged enough already, and he was resonating with it: he didn't need artificial stimuli. Together they walked out on to the view-ring, and the galaxy passed beneath their feet as *Worldchanger* revolved, ponderously and inexorably.

Somewhere ahead of them a crowd was chanting. "*Prissie! Prissie! Prissie! Prissie!*" A very thin man in a skintight yellow suit was standing on a table, shouting the mock jeers down, telling a story: ". . . so Earth-Mother was disappointed when Katy Meteorite killed the dinosaurs, and She vowed to evolve a creature that could learn to protect Her against incoming space debris. And thus the Spacefaring Ape was born."

"I didn't realize they'd let any Pristines on board," said Lisbit, hoping to provoke a response that would prove Jarret wrong about Marty. Where was Jarret? Oh, he'd be on duty. Loommaster.

"They'd never do that," said Marty. "How many EEs have you taken? He's just making fun at the Prissies' expense."

"Every planet is an aspect of the Earth-Mother," Thin Man preached, hamming it up for all he was worth. "A living orgasm of compendous stuplexity." The crowd howled in merriment. "Until *Homo Nosipaca* the Spacefaring Ape rebelled against its parent and turned murder—"

He took her elbow, propelled her away. "Let's move on, Lisbit."

A soft voice said, "What's the hurry, Martival?" and Jarret slid out from the crowd. "Typical Prissie sympathizer, can't take a joke."

"You should be weaving geodesics," said Lisbit.

"Not tonight. Reassigned. Tell you about it in a minute. First, I need a drink." He grabbed a squeezebag from a pile on a side table.

"Jarret, I've told you time and time again that I have no objection to the general principle of terraforming—provided the laws on environmental impact are observed."

"Prissie laws."

"Passed by the Sphairarchy," Lisbit pointed out.

"I don't agree with everything the Pristines say," said Marty. "I just think that it's stupid to poke fun at people who are appalled by the dissolution of an entire ecosystem, however stupid some of their—"

"Even an Other ecosystem? The Others were here before us, Martival! This isn't Untouched Nature, you know."

"It was bad enough that we had to destroy the Others. We don't have to eliminate any trace that they ever existed!"

Jarret gave a humourless laugh. "They gave us no choice, and we need the room to expand. Other-formed ecologies are artificial anyway. And the Pristines got what they wanted."

"Gestures, Jarret. A few hastily selected organisms and environmental samples on their way to make trioaramas for the zoons." The zoons were clusters of huge self-contained cylinders that spun in isolation around all the major worlds of the Sphairarchy. The Pristines had successfully lobbied for laws that required representative samples of the existing ecology of any world to be placed in the zoons before terraforming permission would be granted. Even the more ardent 'former agreed that genetic diversity had to be preserved.

Behind them, Thin Man was warming to his theme. "The life contained upon a motherworld has an inotherable right to exist. And us Prissies will protect it—to the death!"

"Whose death?" yelled the crowd.

"The motherworld's, if necessary!" cried Thin Man triumphantly. "We're all Prissies here." He began to laugh, and fell off the table. Marty remembered that actually, he didn't much like parties. Not this kind, at least.

"By the way," Jarret said without warning. "They turned down your request for transfer to Halfway."

Marty's face fell. "But—"

"You're a security risk, Martival."

"So you say."

"Your sympathies are public knowledge."

"Oh, come on, Jarret," protested Lisbit. Marty had once argued publicly that the Prissies had a point, and Jarret had taken an instant dislike to him. "Everybody knows it was just the endorphin-enchancers talking! That's why Marty's sworn off EEs!" She turned abruptly to face him, her halo swirling chaotically. "Isn't that right?"

"I—uh—I'd rather not talk about it," said Marty, visibly upset.

"I'm going to Halfway," said Jarret, rubbing it in. "On *Wormrunner*. That's why I'm not loommaster for the big event."

"Can I have your cocoon?" said Lisbit. "They designed yours to fit your head, Jarret. I could do with a lot more space. Come on, Marty, I have a sudden craving for chovies."

Marty pointed her towards a floating tray of eateasies, and Jarret trailed after them. "All gone, by the looks of it. I'll order some more." He tripped to VR and his eyes glazed. Then he was back.

"Weird."

"What's weird, Marty?" asked

Lisbit.

"Prissie-lovers are weird."

"Shut up, Jarret. Marty, *what's* weird?"

"*Worldchanger* says it's run out of chovies."

"They do say," Jarret muttered, suddenly serious, "that strange gaps are showing up in the inventories. And a lot more important than chovies."

"I'd heard that," said Lisbit. "But the clippers should restock anything that runs low."

"Lisbit, when did you last see a clipper docking?"

She hadn't really noticed, but now that Jarret mentioned it . . . "Not for weeks. No wonder we're running out of stuff. Do you know you can't make nonEcom calls any more?"

"Maintenance," Marty said.

"Rubbish," said Jarret. "*Worldchanger* is a prestige project. They'd set up a duplicate."

"New policy from the Sphairarchy," said Marty. "You know how unpredictable it can—"

"Fellow 'formers, the ceremony begins," said a disembodied voice, and there was a sudden silence. Lisbit switched to VR, for a more vivid experience. Marty joined her, linked them into a duplex. Jarret wandered off, but neither of them noticed.

The stars above the horizon began to bend.

The planet shivered, tiny pulsations rippling across its surface, a shifting moiré sea. Under the influence of *Worldchanger's* powerful looms, spacetime melted and flowed.

"Who's loommaster, now that Jarret's been reassigned?" asked Marty.

"Must be Kraczyk. Oh, *look* at that line of volcanoes!"

"Those are to relieve internal stresses."

"I *know* what they're *for*; but they *look* fantastic! Where's your sense of poetry, Marty?"

"I was wondering why the Sphairarchy would reassign Jarret, just before something as important as Place-and-Name. Kraczyk's not in the same class."

Lisbit was irritated. "Marty, forget Jarret. Forget Halfway. Enjoy being here! You know how the Sphairarchy works. Overlapping spheres of influence, competition between adjuncts, all a constant sea of flux. That's how Prissie laws get passed. No central decisions because there's no center. Probably some adjunct wanted Jarret on Halfway more than Hambling Sphairarch Orbis Blackwater wanted him here."

Marty nodded, but was unconvinced. He was about to say that there must be a better reason, when the voice spoke again. "Now, a Name."

They voted to call it Godiva. Never had a planet been more naked.

The party started to get wild after that. Only the duty operatives and the Organizers saw much of what happened next; but it was all preprogrammed, so what the heck. As a result, most of them missed the opening up of a momentum channel from Godiva to a junk moon six planets out, as the naked lady's spin was bled off and her equator skewed away from the ecliptic. They missed the raster-scanning of presh- and tracbeams, faster than the eye could follow, carving out oceans and piling the debris into continents, trimming the subcrustal flows, enrolling natural vulcanism as a safety-valve, triggering tailored earthquakes. They missed the Deluge, funnelling the oceans back from storage tori. They missed the dense clouds of volcanic gas that seethed across the surface, raw materials for the coming atmosphere. Now hordes of chemists, transmuticians, lifeseeders, prokaryoticists, ecomanagers, climate-controllers, botanists, zoomorphists, and aesthultants would be unleashed on the trillion fine details that go to make a viable terraformed world.

As soon as they had recovered from the party.

The light came on, swelling from pitch darkness to a soft glow, reacting to Martival Memekeeper Kwathumba Cooroo as he stumbled from his cocoon, rubbing at his eyes, wondering what—

If that infernal flashing doesn't stop it'll take my head off.

Flashing?

Something's wrong with my implant. He shook his head, trying to clear a brain as bleary as his eyes. *So much for staying off the EEs. I hope I didn't mount a public defence of the Prissies again.* A face appeared, seeming to hover in space. It was Kraczyk, who seldom wasted words. "Martival, you've been reassigned. A rolbar will arrive at your door within fifteen minutes. By then you will have packed a maximum of five kilos of personal baggage. Don't bother with spare clothes, you'll be outfitted before you leave."

Marty shook his head in bewilderment. "Leave for where?"

"Halfway."

"But I was turned down. Just a dreamer. Not practical enough."

"Security risk, actually, Martival. But Halfway wants a memekeeper and you're it."

Halfway wants... "Then the non-Ecom isn't down at all!"

"No, they just don't want everybody running up huge bills for long-distance. Don't ask me, Martival, I'm only the one in charge. The rolbar will escort you skinside, where a one-man incher is being warmed up —specially for you. Do you realize how much that *costs?* They must want you pretty badly. The flight plan is already uploaded, eight hundred inches, no timeouts, you're in a hurry. Move, Martival!"

The face faded and Marty's implants reverted to individual control. It took him five minutes to download as many archive files as possible into his personal org, before stowing it in the side-pocket of a travel bag. Realizing that time was running out, he threw possessions in after it, choosing almost at random. He didn't really care, only one thing mattered. Halfway!

As he climbed into the rolbar, a thought that had been lurking in the darker corners of his mind finally crawled into the light. Jarret should have nonEcommed those orders directly to him in VR-analog—relayed from *Wormrunner.* It wasn't Kraczyk's job.

What had happened to Jarret?

Marty was still worrying about it when a scratch crew arrived to install him in the incher. He was probably the only person on *Worldchanger* who knew that the inchworm drive was named after an extinct caterpillar. He was certainly the only person who knew that originally an "inch" was a measurement no longer than a human thumb-joint, in contrast to its present-day meaning of around a hundred light-years. The inchworm drive uses a geodesic loom to weave a linked pair of dual singularities, a U-tube between different regions of spacetime, a "wormhole" in antique parlance. Previous attempts at a non-Einsteinian drive had all foundered on the same reef: a long static tube is unstable. It breaks apart into a string of black holes, much as dew on a spider's web splits up into droplets instead of coating the threads evenly. More than one pioneer had acquired his own private miniverse.

Marty ran through the pre-flight checks, paying extra attention to the timing circuits. If those failed, he'd end up alongside the pioneers. The inchworm drive overcomes the instability of static tubes by keeping its wormholes in motion. An untethered tube just drifts randomly, so at least one end must always be hooked firmly into the normal continuum. The inchworm drive creates a U-tube, and locks one singularity in position. Then it pushes the singularity at the other end past neighboring regions of spacetime. Before instabilities can cause a collapse, it locks the far end, unlocks the near end, and "inches" it forward until the tube is again a short U.

Each step is, by definition, an inch long. Marty's implants spread the flight-plan across his vision. Eight hundred inches, eighty thousand light-years. From the periphery of the Sphairarchy to the Greater Magellanic cloud was twice that—hence the name Halfway.

He energized the loom, well below threshold, the serviles making sure that he didn't create any microcosms anywhere near *Worldchanger*. Microcosms are miniature black holes, and the inchworm drive spins off a lot of them. They evaporate within a few days through Hawking radiation —which is fortunate, otherwise no ship could ever safely come near another's wake, and microcosmic pollution would render the galaxy uninhabitable.

Traffic took temporary control of Marty's implant. "This won't be a standard run, pilot. Normally we allow a week between flights for the wake to dissipate. But you're hard on *Wormrunner*'s heels, so we'll stagger you. Whatever you do, don't disengage the drive, not even in an emergency—or you could get sideswiped by *Wormrunner*'s wake as it travels down the track."

"Understood. Hey, Traffic: what happened to Jarret?"

"I don't have that information, pilot," Traffic lied. "Stand by to engage."

Eight hundred inches.

Each inch occupied a few minutes of subjective time, all but a split second of that being taken up with weaving the geodesic locking webs. The actual movement was almost instantaneous. Aside from periodic checks on progress, there was little for Marty to do. He took catnaps and dreamed yet again about changing the universe. That soon palled: he had no idea how. Still, it seemed he'd achieved his other ambition, to get to Halfway. His mind wandered. Thin Man's sneers about the Earth-Mother Hypothesis still rankled. Maybe the Prissies really did have a point. He called up Minerva on his implants, so that he could debate the issues with an independent intelligence.

The concept of a planetary ecology as a kind of super-organism, with its own regulatory systems, its own homeostatic feedback loops, had been around almost as long as the concept of ecosystem itself.

Inch . . .

It was an entirely respectable point of view, Marty argued, with lots of historical precedents—Gaia, helicoid hypermodels, fluctuational biomechanics. . . .

To his surprise, Minerva agreed.

But.

"But it's an illusion, sir. There's no actual content. *Any* ecosystem will possess a large number of structural feedback loops that have been fine-tuned by a billion years of evolution. In that sense, yes, you can reasonably compare a planet to a living organism."

"Then you accept that there may be something to the idea."

Inch . . .

"No. The analogy gets stretched too far. You could equally well compare it to a machine, or an economic system, or an anthill. The idea that a planet might posses an inbuilt ability to respond to threats—let alone possess its own agenda, active purposes of its own—is just an anthropomorphic conceit, put about by Prissies for political gain."

Anthropomorphic conceit: that was rich, coming from a VR-analog. Marty rose to the bait. "Organisms have active purposes."

"Organisms have evolved the ability to protect themselves, through competition and selection. You call that kind of behavior 'purpose.' It would only be able to develop on a planetary level if there were some kind of natural selection that operated on entire planets."

Marty laughed. "There is. Thin Man said it."

"Thin Man?"

Inch . . .

"An idiot in a yellow suit. But what he said makes sense. A planet that evolves spacefaring apes is better protected against meteorites, so it's fitter to survive."

Minerva considered this. "I'm sorry sir, I garbled the argument. It's not just selection. The survivors have to be able to reproduce. Otherwise it's just a process of attrition."

The fascinating thing about virtual-analogs is that sometimes they say things that their creators don't expect. Up until that point, Marty felt he'd been winning the argument. But now . . . "Planets don't reproduce, that's what you're telling me."

"Right."

"So the survivor types don't increase in numbers."

"Precisely."

"Which means they can't really evolve. Damn." He'd run out of intellectual steam. So that was the basic flaw in Prissie thinking. "All right, I give up—no, wait a minute!" He tried to leap to his feet but was restrained by his cocoon.

Inch . . .

He hardly noticed, such was the enormity of the thought that had struck him. "Like hell they don't, Minerva. I agree planets used to not reproduce, but now—what do you think *Worldchanger* is doing?"

The analog's face fell. After a lengthy pause, it said reluctantly: "Sir, I must point out that it's not really repro—"

"Yes it is! I agree it comes about through complicity between planets and their human inhabitants, but . . . 'Earth-Mother gave birth to a race of spacefaring apes, able to go forth and multiply Her by terraforming her competitors. And soon the galaxy was dominated by planets just like Her.' Damn it, Minerva, we don't reproduce either, except with the help of our DNA. This is exactly the same, but carried out using technological memes in place of genes."

"I won't be convinced, sir, unless you make a testable prediction. You're just reformulating, like the Pristines."

Inch . . .

"Give me a chance! I've only just thought of this."

"Don't duck the issue—sir. Um. When you were talking to the Lisbit-analog you said that whenever something managed to get the replication trick working well, parasites would soon appear and hijack the process. You claimed it's a universal pattern. So where are the worldforming parasites?"

Marty's mouth fell open. *This is what you get by taking your own ideas seriously.* Worldforming parasites. "Look, Minerva, there's obviously no such thing as . . ."

Oh, but there is.

"The zoons. Minerva, the zoons are worldforming parasites! Every time we terraform a world, the zoons get a free extra ecology!"

"Yes, sir, but they don't reproduce."

"Good point. No! Not so good. Every dozen or so new planets terraformed, the Sphairarchy expands and an entire new set of zoons get created! They're simpler than planets, they can't reproduce by themselves, but they neatly subvert the terraforming process so that they get replicated as a byproduct. My case rests."

Minerva flapped her stumpy tail. "I'm still not convinced, sir, but it's a good start."

Inch . . .

He laughed, loudly and joyously. "Good start? It's brilliant!"

She grunted along with him, but suddenly stopped. Her pupils dilated, it made her look soulful. "Sir: do you realize that this idea torpedoes your deepest-held beliefs?"

His face was a picture. "What?"

"Thinking it through, sir. Why did the Others tear up so many planets? Why are humans tearing them down again and rebuilding them in Earth-

Mother's image?"

"You're saying that we have to terraform as many worlds as we can, because evolutionary pressures have pushed us that way. The combined Earth-Mother/apeman system has evolved jointly towards that imperative."

"Yes, sir. There's no more purpose to it than there is to anything else that has evolved. The human sex-drive, let's say. But that doesn't make it any more possible to resist it. You're trapped in your evolution-moulded bodies, your drives are the result of an evolutionary dynamic, not something you had any choice about. Planetary systems don't normally evolve—but ones that have inhabitants with worldforming capabilities do. And the ones that survive are the ones whose reproductive accomplices create as many copies as possible of their homeworld."

Marty still hadn't understood. "You said it contradicted my deepest beliefs. I may have some Prissie sympathies, but I'm not a Prissie, Minerva!"

"That's not what I mean, sir. Don't you see?"

"See what?"

Inch . . .

"The Other Wars."

Now he understood. "You're saying that the Other Wars were inevitable. That the mindless dynamic of planetary evolution made them as irresistible as the human sex drive. That we've been evolved—so to speak—to fight that kind of war."

"Almost. You know that evolution doesn't care who wins, sir, or how—it just prefers winners. I think humans are a more successful mutation than the Others. If you'd been less aggressive, then the story would have been: 'Other-Mother was pleased when Her creatures killed off the monkeys that were preventing Her kind from dominating the galaxy."

Inch . . .

Inch . . .

Inch . . .

Inch.

He had visualized it a thousand times in virtual reality, but the real reality was different. Halfway, thought Marty, might be better described as "half-built". It was certainly impressive, but in the manner of a construction site. Which it was, in a way, although the bulk of the visible structures had been finished long ago. The activity, the mess of organized chaos, was just the final stages of preparation for the great experiment.

The "finished" object was a little difficult to describe. The central hub was a ramshackle assembly of living quarters, factories, power units, docking bays, and maintenance sheds. He got a strange feeling that something was missing there, but he couldn't work out what. Around it were tethered a variety of peripheral defenses and communications facilities. The most important components were several thousand kilometers distant, a rosette composed of precisely 16,384 snub cones. Matter-compressors.

The cage was ready.

Soon the captive would be too. A captive black hole, an experiment in large-scale stability.

If it worked, a gateway to the stars. A stepping-stone to the galaxy's nearest neighbors. If it failed—well, that was the other reason for building it 80,000 light-years from anywhere.

The inchworm drive was one way to beat the instability of wormholes. The other was to make them bigger. That was the theory. Halfway's job was to test the engineering practice.

Marty's cruiser made rendezvous with a pilot probe, which plugged itself in and maneuvered the craft in a twisting flight-path past various mobile obstacles. The docking bay was very different from those on *Worldchanger:* heavier, more functional, simpler. He completed postflight procedures, deactivated implant-links to the cruiser, and hooked into Halfway's Organizer.

Following VR signposts, he left the ship and headed for the raveller's office. On the way, he realized what had been missing when he first made visual contact with Halfway.

Wormrunner.

So Jarret wasn't on Halfway at all. Which explained why he hadn't passed Marty's orders on in VR-analog. Where the devil was he? Marty reached the office, and the door opened automatically. He stepped through.

There were only two people inside, a woman and a man. They both looked worried. And very, very tired. There was an empty chair, and he accepted the invitation to sit. Brief introductions were made. She was the Sphairarchy's local troubleshooter, Ellamay Raveller Smallweed Toon. He was Fussom Sistor Claybrook Hurricaine, her universal fix-it.

"I expected Jarret to be here. Where is he?"

"Jarret's dead," said Ellamay.

"What?"

"Wormrunner never made it."

Marty didn't know what to say. He'd never liked Jarret, but it left a hole in his universe. Nobody to fight with. Well, run away from. "I'm not the only replacement, then," he said, when the silence had stretched close to breaking-point.

"For the moment, you are. In my view we need someone with Jarret's experience, but you're what Choice has sent me, it alone knows why. I suppose the reasoning is that we need a thinker, not more doers. You've got the profile that matches the problem. So I'm told." She looked as if there was no particular reason to believe a word of it. "Don't look so pleased, they also say that you're a bit weird. Mind you, so is the problem. The two of you should get on well together."

Marty swallowed his pride. He'd wanted to get to Halfway, and here he was. No need to stir up trouble, "What happened to *Wormrunner*?" It was difficult to believe they were gone.

"We think it brushed against a rogue wake," said Ellamay. Marty had never heard the term, so she explained—making sure he felt suitably ignorant. "For the past two months or so, we've observed unpredictable streamers of microcosms. They appear spontaneously—or at least, nobody can work out why. *Wormrunner* isn't the only ship that's been lost."

The clippers... that's why they'd stopped arriving. A few lost, the rest canceled until somebody worked out why. And so far, nobody has...

Traffic knew this... Why did they lie to me? "I traveled eight hundred inches to get here," said Marty. "You're telling me that on each side, I risked destruction by a rogue wake?"

"Yes. Be glad you didn't join Jarret." She didn't sound as if she was.

Marty was about to protest—but it was obvious enough why he hadn't been told anything. Nobody wanted this to get out, it would cause widespread panic. Admittedly the Sphairarchy was a loose-knit structure—deliberately so, for nothing else would have worked, given the huge distances—but it would fall apart without effective transportation. He looked at their faces. That explained the worry, yes... but not the tiredness. The hostility he could live with, it was probably a symptom.

The nonEcom nonsense must be part of the same picture. Non-Einsteinian communications made use of long thin wormholes—cosmic microstrings. "You haven't told me everything."

"No. But it's simpler to show you. This is from one of our warm-ups." Fussom ran a recording. The room fuzzed out as VR-environment took control of Marty's senses. He saw, as if from a great distance, Halfway's ring of matter-compressors, represented as schematics for visibility. At their center was a glowing sphere, which he recognized as a neutron primer. Under the imposed gravitic pressure it would collapse, creating a small but tame singularity that could be fed more matter until it grew into the raging monster that Halfway had been built to create.

He watched the sphere brighten as it shrank, becoming an incandescent pinpoint. It seemed to flare, a sudden spear of light, impossibly thin. Then, abruptly—it was gone.

No singularity. No event horizon. Just flat spacetime. A trillon tonnes of neutrons had vanished. The VR faded back to real reality.

"This—this happened recently?" Marty asked, in a state close to shock.

"It happens every time we try to prime a black hole," said Ellamay. "Instead of the primer setting up a horizon, it pinches off altogether. We don't get a bulge in our own universe, not even one with a singularity acting as a barrier. It breaks away completely. We think. It's not as if there's any way to tell for sure."

"A new instability," said Marty.

"Looks like it, yes," said Fussom. "But according to the simulations, an instability that should not occur. And until recently, it didn't. All our early attempts at priming worked fine."

"When did the problems start?"

"About two months ago. Yes, the same time that the rogue wakes first appeared. Did you notice the flare? That was a beam of microcosms, and it appeared just before the horizon pinched off. That's completely typical."

"And this is what you brought me here to solve?"

"Choice sent you here. You don't fit neatly into any standard personality category. You make dreadful mistakes—like falling for Prissie propaganda. Quiet! They tell me that you also see things that nobody else does. You think about problems sideways on. We need—I am assured—your warped little mind."

Well, you wanted to change the world. Here's your chance. Not so easy when it comes to the crunch, is it? Come on, think.

Marty thought of a lot of things, but of course they'd tried them all. One was to take graviscans. There were thousands on file, and they revealed the basic processes in exquisite detail. First, a growing peak as the neutron primer underwent a controlled, step-by-step contraction under the influence of the ring of mass-compressors. Then, traveling inwards on two opposite radii, streams of tiny spikes, the anomalous microcosms. The primer peak began to oscillate chaotically in response to the bombardment. Then it suddenly inverted, pushing through itself. Its neck narrowed, momentarily forming a sharp cone. As it did so the mass content dropped abruptly to zero. The cone smoothed out, flattened.

He offloaded the entire sequence into his org, shut himself away, and activated Minerva. He wasn't going to crack this one on his own.

"It's like nothing I've ever come across in this universe, sir."

"That's because it isn't happening in this universe. We're like tadpoles in a puddle, Minerva. All that we can experience is contained in that puddle. We can't detect any other puddles, even if they're only a few feet away. If a child jumps in our puddle and splashes drops on the sidewalk, we can't see where the water went. We just lost part of our puddle. If a tadpole gets splashed out too, its universe suddenly contracts to droplet size. Just like the early non-Einsteinian pioneers."

"Multiverses."

"Exactly. A foam of universes, some inflated to vast size, some tiny. Occasionally they produce buds—the microcosms thrown off by an inchworm drive, the microcosmic braid of a nonEcom message, the bigger buds off a neutron primer, the semi-isolated bud of a black hole. Those buds poke out of our universe."

"Into what, sir?"

"Not into anything. They just poke. They create their own spacetime. But you can get up a mathematical fiction, a 'space' for them to bud into. Paraspace. It has its own spatial and temporal dimensions. When a universe buds in paraspace, its dynamic runs in paratime."

"And what we're seeing is not just a bud, not even a bud with a horizon, but a separation."

"Yes. We tadpoles watch uncomprehending while our puddle loses a splash."

Minerva thumped her tail in excitement. "So a parachild has stomped in our universe and upset us tadpoles. Sir."

"I wouldn't go as far as to say that, Minerva. It must be an internally generated phenomenon. Maybe the concentration of mass-compressors has upset the local continuum's fine-tuning."

Minerva stared at him. "Why must it be internally generated, sir?"

"Because paraspace is just a mathematical fiction. There isn't really anything out there. There isn't a 'there' to be out."

"Tell that to the tadpoles, sir! What I see is a lot of neighboring parapuddles, and a horde of parakids galloping through them, splashing every which way. Water going everywhere, and the pig-ignorant tadpoles with it."

"It's a nice image."

"Halfway has lost more than a dozen neutron primers, sir. How can you still say there's nothing out there? Even if you're spitting them out of the puddle yourselves, the splashes have gone somewhere. So why couldn't there have been other junk out there all along?"

Good point. And Marty realized something else. The lost matter couldn't possibly be an internal process—that would violate conservation of information. A process confined to a single universe cannot transmit anything through paraspace. It takes two to tangle.

Which reminded him of something else. Smolin Theory.

"Minerva, have you heard of the anthropic principle?"

"No, sir. Not my species."

"It's an old idea, goes something like this. A bunch of people survive a rolbar crash. They ask their rescuers 'Why did we survive?' The rescuers say 'Don't be stupid. If you hadn't, you wouldn't be here to ask that question.' "

"Very amusing sir. But what's it got to do with missing bits of parauniverse?"

"The laws of physics have a lot of arbitrary constants. Things like the mass of the electron, the speed of light, Planck's constant. Nobody knows why they take the values they do. But, if they were changed just a little bit, we wouldn't be here to ask why they have the values they do. For instance, we're made of carbon, and carbon is made in stars during the early expansion of the universe, and carbon only gets made because of a very close near-resonance in electronic energy levels, and if Planck's constant were even a little bit different, that coincidence wouldn't happen."

"Oh. So it's silly for a human to ask why the constants have those values."

"Not entirely. It does follow that, should beings like humans exist at all, then they have to be in such a universe. The question is, why should they exist at all? It would be a ridiculous coincidence if the only universe just happened to select those values for its constants, choosing at random. It's the same problem we discussed about the Earth-Mother Hypothesis. There's no reason to get a finely-tuned individual unless it belongs to an evolving population."

"And you pointed out that terraforming ape plus planet gives exactly that."

"Right. Now, long ago, there was a man called Smolin."

"Smolin what?"

"I don't think his full pathname is recorded, Minerva. He suggested that whenever a new universe buds off in paraspace, its physical constants undergo random mutations. Then you get a kind of natural selection for universes that produce lots of buds. Our particular set of constants isn't just good for making people: it also makes lots of black holes easily. So our kind of universe wins the evolutionary battle. And that's why we're here to ask why we're here."

Minerva thought about it for a few minutes. "Don't you see?" asked Marty, when she didn't respond.

"Yes . . . I do. Maybe more than you, sir." Her eyes opened wide. "There's still a coincidence that you haven't explained."

"Huh?"

"Why are the constants that are good for black hole budding also the constants that make people?"

Marty had got used to being admonished by a beaver, but this he hadn't expected. "I told you. Carbon resonances and . . . oh."

"Sir, it has to be complicity! Your idea for justifying the Earth-Mother Hypothesis is that there's complicity between planets and their intelligent inhabitants. Nature selects for a combination, not just for one or the other!"

"Yes, but—"

"That was *Worldchanger*, sir. Now you're on Halfway, which isn't into terraforming, but is in the universe-budding business. So everything ought to follow the same lines."

"You mean—"

"Yes, sir. Universe plus creatures that can cause them to reproduce by budding will co-evolve more effectively than universe with—or without—creatures that don't!"

Marty's mind felt as if it would explode. Of course! He knew the feeling well of old, the absolute certainty of knowledge. Knew, too, to be suspicious. Most times, it evaporated if you asked a few awkward questions. That, he felt, was the problem with religious faith. It wasn't enough to know. You had to be sure that your knowledge wasn't self-delusion.

It was the same idea as the Worldforming Ape, but writ large. The Universe-forming Ape. And since the patterns of evolution were themselves universal, it followed as night followed day that—

And that thought was too big for one head to hold.

Ellamay perched precariously on the corner of her desk and stared at him. "You're saying these anomalous microcosms are parasites?"

He shook his head. "Not exactly. I think they're caused by parasites. Parasties in paraspace. Simpler universes than our own, universes that can't spawn their own offspring. Universes with the wrong physical constants. Universes that help themselves to some free matter when ours tries to build itself a black hole."

Her level gaze met his. "What's your evidence?

"I've told you most of it. Parasitism is a universal phenomenon in an evolutionary system—and that's precisely what you've been so busily setting up!"

She considered that. "But why didn't it happen before?"

"We hadn't attracted the parasites'

attention before! We'd kept pretty quiet, in the universe-budding game. Just the odd string of short-lived microcosms spun off by inchworm drives. Then Halfway started priming black holes with neutron matter, and the parasites infesting paraspace began to notice. They use microcosms as sense-organs, a kind of paraspatial sonar. That's why we see a burst of them whenever we lose a black hole!

"They stole our babies. Not only that, once they'd got interested, they noticed the wakes of our inchworm drives, and started interfering with them, too. Which is what killed *Wormrunner*. And then, of course, they latched on to the cosmic microstrings that we use for communication as well, so that all got all fouled up, and the Sphairarchy had to impose restrictions."

"Why now? Why not sooner?"

"It's a bit like allergies. You don't notice until you're sensitized. After that, even tiny quantities set you off. Halfway's black holes were like a massive shot of cosmic histamine. The parasites haven't stopped sneezing since."

Ellamay got off the desk and paced up and down the tiny office. "OK, suppose I buy this nonsense. What use is it?"

"It tells us what we're up against. It suggests preventative tactics."

"Like what? Nasal sprays?"

"Decoys. We send out cheap machines that spin off microcosms. Gravitic chaff."

"If you're right, the parasites will evolve until they learn to ignore the chaff."

"Sure, but we buy time. And that's just the simplest idea. We can develop our own parasonar, find ways tò block theirs . . . it's an evolutionary arms-race. Mmm . . . take the argument one step further. What happens in an evolutionary system after parasites develop?"

"I have no idea."

"Hyperparasites. Parasites even simpler than the original parasites. First comes the complexity that enables reproduction to occur. Then cheats subvert it. Then more effective cheats exploit the cheats. We ought to be able to make something really simple that infests the parasites and keeps them at bay. We seed paraspace with them, and leave the rest to para-evolution."

"Like what?"

"Well—remember, the way these universes differ from each other is in their physical constants. If you set up the right system of physical constants, you'd get a really simple universe—containing only one particle of matter, say. You could redefine Planck's constant to give it a unique energy-level, that sort of thing. Replicating a universe as simple as that would be easy if it was hyperparasitizing one with lots of particles. Then you make it malignant as well as replicable. The wrong particle in the wrong place—no, of course, the wrong time! Shove it in at the instant of creation and you could wreck any nascent universe!"

"A sort of univirus." Good grief, Ellamay had made a joke that wasn't at Marty's expense. "Sounds like a long shot, but worth a try. I'll get the loommasters onto it immediately. You got any more tricks in that weird head of *yours?*"

"Yes, the big one. Immunity! The host species finds ways of adapting that defeat the parasites!"

She laughed, but without humor. "You're saying we just sit back and wait for immunity to develop?"

"No, I'm suggesting we develop a vaccine. We universe-forming apes have to give mom a helping paw."

"You mean we've got to develop something to stop whatever is producing the microcosms from stealing our baby black hole? What the hell do you think we've all been doing these last two months?"

Marty reached inside his tunic and extracted his personal org. "In here is an outline for an adaptive system that runs interference with the parasite's microcosm stream. It analyzes how the microcosms gobble up the neutron-matter primer, and fine-tunes its parameters to stop them. It doesn't have to be 100 percent effective. If we make life sufficiently difficult here, the parasites will find some other sucker."

Ellamay activated her implant, and Marty offloaded the outline. "Interesting," she said, with obvious reluctance. "We tried something along these lines, but it never occurred to us that the parasites would fight back. Adaptive strategies . . . worth a try. Can't use this as it is, though: it's a bit hacky. I'll put our programmers on the job straight away." She turned to him with a new-found respect. "Martival: this may be premature, but I suspect you've justified all the trouble I went to to bring you here. It's more than I expected, I admit. A *memekeeper!*" She shook her head in wonderment.

The nonEcom link was back. Volunteer crews were out in inchworm drive ships, testing microcosmic chaff. It seemed to be working. Marty had achieved his ambition, got to Halfway, and now he knew it was no kind of answer—just another cocoon, so many layers inwards that the rest of the universe ceased to have any meaning. He couldn't hide himself away any more. He missed *Worldchanger*, missed Lisbit, even missed Thin Man in a perverse sort of way. . . . He'd changed the world, just like he'd wanted to.

The Prissies had missed the point. If you preserve everything, nothing can change.

Jarret was dead.

Everything was *different.*

Everything was the same.

Bored, he flipped into VR. Minerva was waiting. He'd been so excited with his discoveries that he'd forgotten to deactivate her, and she hadn't been idle. "I've been thinking it through some more, sir. The presence of parasites can't be coincidence."

"No, it's complicity in paraspace."

"Yes, sir, but they couldn't have appeared fully formed in response to our attempts to make black holes. Parasites take time to evolve, too."

"Paratime, Minerva. The timing in our universe is arbitrary."

"Yes sir; but the dynamic takes place in paratime, so my point remains valid. The parasites must have been fully developed before—speaking purely in paratime terms, sir—they noticed this universe. So we can assume that there's quite a population of budding universes out there in paraspace. Maybe some variants of you universe-forming apes too, but that's another matter. There's a whole ecosystem out there, populated by universes. An old ecosystem. A very well developed ecosystem. And now this universe has attracted its attention."

"What do you mean?"

"The kids have noticed the tadpoles, sir."

"Oh, come on, Minerva, that was just a silly—"

"No, it wasn't sir. Go back to the universals. After parasites, hyperparasites, and immunity, what comes next in an evolutionary system?"

"Um. social behavior . . . oh-oh. Predators."

"Precisely, sir. Predators. Universes that reproduce by eating other universes. Equipped with their own universe-eating apes. I very much hope that humans' paraspatial disturbances haven't attracted their attention, as they have the parasites. I'm afraid that all these decoys and hyperparasites and immune systems are only going to make them more likely to notice you. You'd better start working out ways to protect yourselves. You may even have to become universe-eaters as well, to survive. Sir: I regret to point out that it will make the Other Wars look like a picnic."

Evolution doesn't care who wins, or how. It just prefers winners.

Martival Memekeeper Kwathumba Cooroo had wanted to change the universe.

But not quite this radically. ■

The world cares very little about what a man or woman knows; it is what the man or woman is able to do.

Booker T. Washington

Thomas Donaldson

THE HOLES OF SPACE-TIME

Many science fiction stories follow the hard sciences very closely except for one critical point: somehow a way exists to move a spaceship faster than light. This way might be a form of superlight transport, or a way to leap across light-years through hyperspace, or a postulate that sometime in the future we will find many wormholes scattered throughout the space we know, and use them as roads to other stars. For many years, not one of these possibilities has had any scientific support: all stories making use of them were therefore pure fantasies, whether they involved witches and unicorns or not. Could there be any way to jump over that barrier? What are physicists thinking about now?

This article will discuss some of the wilder realms of speculation relativistic physicists have had about the Universe, its structure and (often only by implication) what kinds of phenomena we may someday discover that will make this entire vast Universe seem as small as the period at the end of this sentence. I shall try in each case to discuss only those ideas that are not in flat contradiction to what our *experimental* science tells us (reminding all readers that many dominant theories still lack a good deal of *experimental* proof!). That doesn't mean that the ideas must have their own experimental support, but only that they do not predict phenomena which we *know* from our experience do not happen.

I shall also make one special restriction that knocks out a good many other ideas, but not because they are wrong: I shall discuss here only ideas which might lead to two-way travel.

Many ideas in general relativity (but not all) posit wormholes to other places accessible only through a one-way process. I have no criticism of these ideas as ideas; but methods of transport which go only in one direction to an unknown destination can't seriously be used either to find other universes or for travel within our own.

And so, with these broad ideas in mind, let's see what we might get:

General Relativity, Wormholes, and Other Kinks and Links

Science fiction readers will guess at once what a wormhole in space might be: it is a tunnel from one location in the Universe to another. If we are to use it for travel, paths through a wormhole should be much shorter than those through ordinary space. A somewhat less frequent idea, unjustly neglected, is that of a door into another entirely different universe. Recently both these ideas have become very interesting to theoretical physicists themselves.

First, current physics faces one major fundamental problem: general relativity and quantum theory almost completely lack any unified setting. Even quantum chromodynamics, the theory of quarks and how they come together to form all the other particles known, contains a big gap: it contains no account of gravity at all. General Relativity can deal with gravity, magnetic fields, and electric charge, but says nothing about phenomena at a quantum level. Yet even if singularities occur nowhere else, current cosmological theories require that they happened when our Universe began. How could we understand that beginning without a quantum theory of gravity? How could we understand gravity itself?

In ordinary quantum mechanics, we cannot simultaneously measure the position and momentum of a quantum particle. The *meaning* of such a relation has remained unclear; nor is there a consensus on how to make a quantum theory of gravity. One way often tried is to think of space-time not as having a single definite topology, but as constantly changing into many different metrics and topologies on a quantum scale, as seen in Figure 1.0. (Similar pictures have been used as a guide to intuition by many different physicists working in the field.)

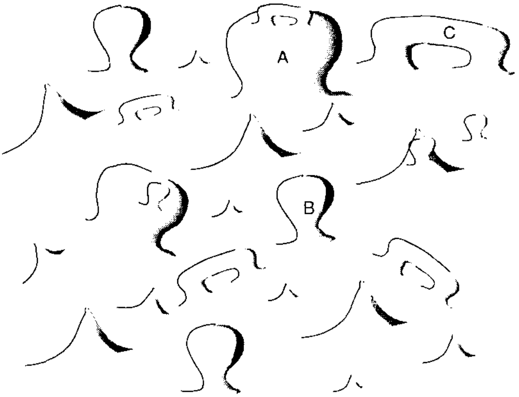


Figure 1.0: Note the other universes being created at A, B, and elsewhere. Also note the large number of topological shapes a quantum theory of space-time allows. Rather than originating in a Big Bang out of nothing, our Universe may have budded off from another, and now buds off others itself.

Since metric and topology continually change, we can think of the speed of this change as analogous to momentum (since any bending of space-time implies the presence of matter-energy, such an analogy is apt). By precisely defining the metric and topology of space-time in one region, therefore, we would lose all information about how it is changing.

If the topology of space-time changes, then wormholes and other kinds of shape changes may continually come into being and then disappear. A wormhole, of course, is one variety of hole in four-dimensional space-time. Other kinds of topological change can also happen, as in singularities such as cusps, where space *ceases to be smooth, or volumes in* which the curvature of space-time ceases to be definable. Figure 1.0 shows several such changes. Since (by general relativity) gravity changes the curvature of space, a quantum version must involve a quantum variation of the geometry of the Universe itself on small scales. It must also involve variation in the *topology* of space, again on small scales. This geometrical and topological variation would play the same role in quantum gravity as the impossibility of finding both position and velocity of a particle at the same time does in standard quantum mechanics.

Several theorists have in fact developed quantum theories of gravity [1], [2]. Unfortunately none came anywhere near predicting the proper values of some critical constants. For instance, the cosmological constant (an adjustable constant controlling the curvature of the Universe in general relativity), thought on good astronomical evidence to be either zero or close to zero, in quantum gravity turned out to be about 10^{73} [3]. That is a very discouraging result: our Universe should then be somewhat smaller than a proton.

The problem remained at that point for some time, until Hawking [4] and others [5] suggested that the quantum character of space might provide a fix. If we suppose that space itself on subquantum scales is not smooth or fixed, but instead consists of a foam of virtual topologies, openings onto other universes—wormholes passing from one point to another within the same universe, all *constantly changing—then the former* calculation of the cosmological constant, redone as an average over all the different curvatures and geometries of the Universe given by this foam, just *might* turn out to give 0. Another physicist, Steve Coleman [6], went on to give more substance to this idea by actually providing calculations supporting it.

In cosmology, this theory went far beyond the Big Bang. It suggested that the so-called Big Bang was actually the time when our Universe split off from yet another universe, and still more were constantly splitting off from us, in a network going back forever (see Figure 1.0 and the discussion there [7], [8]). It also explained why space-time had 4 dimensions [9]: just as universes with cosmological constant zero (0) have the greatest probability, those with dimensions 3 + 1 (3 space, 1 time) turn out to have the greatest probability.

These quantum wormholes or doors out of our Universe wouldn't have any obvious effects. Certainly most physicists studying this wormhole foam doubt that the doors or wormholes created would even admit passage of messages. But after raising the possibility of doors or wormholes in the first place, *large* doors or wormholes don't just obediently disappear. Coleman and others [10], [11] have suggested reasons why small wormholes must automatically suck away the large ones into nonexistence; just like the idea of wormholes itself, their arguments are based on a web of hypotheses and conjectures. Even if these are reasonable, disproof of one collapses the whole argument (as another author notes in [12]). We do not have any experimental proof that large doors or wormholes can't happen.

But wormholes have another source, too; one based on general relativity itself! Sometime before 1988, Carl Sagan in writing his novel *Contact* asked several people working in general relativity to look into the possibility of *traversable* wormholes. One of these was Kip Thorne at Caltech, who points out several varieties of such wormholes in the very readable paper [13] written with Michael Morris. As Thorne and his collaborators explain: instead of asking about the cosmology, why not ask what general relativity can say about the abilities of a very advanced civilization to *create* a wormhole in space? (This is the difference between an inspiring teacher of physics and one who turns their students' minds to the delights of majoring in biochemistry, or astronomy, or accounting, or . . .).

To their surprise, Thorne and his collaborators discovered that conditions at least *might* exist that could be used as wormholes, even traversable ones. "Might exist" means here that no proof currently exists that such conditions cannot occur. (Box 1 gives a more detailed discussion of this issue and the special conditions needed).

Box 1: *Required Conditions for Traversable Wormholes*

In the *American Journal of Physics* (56[5][1988] 395-412), Thorne and Morris find two algebraic formulas stating conditions that a traversable wormhole must satisfy.

First, to create or maintain a traversable wormhole we need *exotic matter.* It is exotic because, for some high velocity observers, it will appear to have *negative* mass-energy. Observers who are not moving with respect to this matter will find the tension τ pulling this matter away from the throat of the wormhole (in both directions) to exceed its matter-energy density: if ρ is the density, then the matter energy-density is ρc^2 and the condition for any matter filling a *traversable* wormhole throat is:

$$\tau > \rho c^2 \qquad (1.0)$$

But exotic matter can exist! Thorne and Morris point out that the Casimir effect between two charged flat plates (a quantum effect of electromagnetic fields on the vacuum) can actually produce matter satisfying condition 1.0. Whether it can exist in the right conformation remains a question.

A second formula relates tension at the narrowest part of its throat to the above parameters for wormhole matter. This is:

$$\tau = L/b_0^2, \qquad (1.1)$$

where b_0 is the radius of the wormhole throat and L is a very large constant (if we measure b_0 in light-years then $\tau = 5 \times 10^{11}$ dynes/cm^2).

In their paper they wanted to test out the engineering plausibility of traversable wormholes. But what might these formulas show us cosmologically? Wormholes with a diameter of 16,000 LY have very reasonable throat tensions, 16,000 LY is comparatively small compared to the size of our Galaxy. So if exotic matter of the sort they describe can exist in the proper conformation, our Universe may already have many such cosmological holes. To an observer far from one, most of the universe on the opposite side won't even be visible; so even with these "classical" ideas our Universe may contain much more than we can see.

One important difference between these wormholes and the wormholes studied by Coleman and others is their *persistence*. I shall call the first kind of wormholes "Coleman wormholes" and the second "Thorne wormholes." A Coleman wormhole usually comes into existence and pops out of existence over very brief time scales (as seen from our Universe). Its unseen result could be another universe entirely, but that universe would only be reachable for a length of time smaller than we can measure. Coleman wormholes change our Universe not as individual universes, but because their creation/disappearance happens constantly.

But a Thorne wormhole can persist *naturally* over very long periods, and therefore present a far larger possibility for technological alteration. We can imagine systematic searches for Thorne wormholes; to search for Coleman wormholes would be like searching for a speck of foam in the ocean: without special engineering, our find will not last long enough to make any use of it. (But nothing here suggests that we might not find ways to change Coleman wormholes into Thorne wormholes).

Thorne wormholes have continued to evoke interest since they were postulated. In later papers, Thorne and others study one of the serious problems with traversable wormholes: that they might allow a violation of causality. Their reasons for thinking this come directly from the fact that a wormhole might allow passage "faster than light" between two points A and B. In general relativity theory the name for such an occurrence is a *Closed Timelike Curve* (CTC for short). By looking closely at what existence of CTCs might mean, they come up with several conclusions. First, CTCs would not imply that any of the known conservation laws are violated; they would however, for consistency, imply limits on the state of the Universe at times after the CTC began. (You could not travel backwards in time and prevent yourself from being born!). Still, if we think about what these restrictions on the state of the Universe might actually mean, there remains some sense of justifiable discomfort. If we tried to prevent ourselves from being born, for instance, does this mean that every such attempt will fail by some unforeseen chance event?

Again, recognizing the problems if CTCs can exist, I.D. Novikov [24] has postulated a principle of self-consistency to explain just how a CTC might still happen.

Other authors have studied this question since [14], [15], [16]. Visser (cf. [14], [15]) in particular argues that we must *assume* that CTCs do not exist. From this assumption, Visser derives some interesting restrictions. First, wormholes cannot be created *de novo;* however, there is no reason to believe that they might not have come into existence when the Universe itself split off from its prior Universe. Rather than constructing wormholes, then, an advanced civilization might actively mine them from stars, planets, or space itself, and then adapt them to its purposes. Second, causality specifically does *not* prevent the deliberate creation of new universes, just as long as the connection between this new universe and our own is never broken.

In each case, Visser also finds that the "natural state" of a wormhole end (or entry to another universe) would normally appear more like a subatomic particle than like a doorway. If electrical charge in this other universe were neutral, the particle would seem to be neutral; only a few extra electrons would make the particle appear charged. A single wormhole *end* might also trap a magnetic field, and look like a magnetic monopole. In neither case would these apparent "particles" act otherwise like any standard subatomic or subnuclear particle. A good deal of energy pumped into this "particle," however, would create a much larger, actually traversable opening.

The possibility of CTCs reaches into the heart of general relativity itself. Many researchers felt that the wormholes of Thorne and Morris had little bearing on "real science" because they could only happen under unusual conditions. But even more recently, another researcher in general relativity, J. Richard Gott, an astrophysicist at Princeton, [20] has shown that some very "normal" objects studied by relativists will also make CTCs. The objects in question are *strings*, a kind of very narrow aggregation of mass energy (and so, bending of space-time) that extends for an indefinite length through our three-dimensional space. It turns out that two strings moving past one another at high velocity can *also* cause formation of a CTC.

Gott's calculations have caused some very prominent cosmologists and relativists to publish their own hypotheses and calculations explaining why his CTCs cannot happen. A. H. Guth and others [21] have argued that the Universe does not contain enough energy to make Gott's strings, showing with calculations that their argument holds in a

(2+1) dimensional space time (2 space, 1 time). (However, in a note at the end of their paper they report calculations suggesting that strings might make CTCs through a different process). Stephen Hawking [23] has suggested quantum mechanical reasons against CTCs; S. Deser, R. Jakiw, and G. t'Hooft [22] have proposed that "physically reasonable" spaces cannot contain Gott's strings because their center of mass moves faster than light. Even if our Universe does not contain CTCs, this work may show that general relativity cannot provide a complete explanation of its large-scale properties. Or could this work finally show that it is wrong?

Even if two-way passages to *other* universes don't raise the same hard questions as CTCs, they raise their own issues too. What would they be like and what might we do to visit them?

Many readers by now must have heard of the cosmological theory of inflation [17],[18] (the idea that upon creation our Universe expanded enormously, and during that expansion all the matter and energy in the Universe came into existence). Just because a universe appears to us to be a particle with similar masses to those of other subatomic particles (as Visser suggests), it does not follow that it is "small." Once we got there, we might well find it as large or larger than our own Universe. Most authors writing on this subject seem to assume that after it splits off, the new universe will go through much the same inflation as our own. If two-way passage can happen, one major limit must be imposed: the Fermi Paradox suggests that we must be the only intelligent species easily accessible to us. Hence these other universes somehow cannot support the evolution of intelligent life. One easy restriction causing that would be that any other *accessible* universe must have an age significantly younger than that of our own Universe.

Science fiction authors might note that even for universes we create, by the time we can visit them they may already be billions of years old. So long as both times go in the same direction, no obvious relation holds between the rate with which time passes in the "baby" universe and the corresponding rate in our own. Perhaps it goes through three billion years in the first ten minutes (of *our* time) after creation, then settles down to our own rate. And unlike black holes and other one-way passages described in general relativity, these wormholes to other universes provide a possibility of *two way* travel. So even if traversable wormholes between two places within one universe turn out to be impossible, wormholes to *other* universes, as discussed by these physicists, provide a physically realistic way to go to many new worlds—and come back, afterwards.

Causal Wormholes?

Plainly, no causality problems arise for holes into other universes. But can *causal* wormholes have *both* ends in our Universe? The answer is *yes.* But we must first strip ourselves of all presuppositions about the conditions

Box 2: *Causal Wormholes*

The formula relating times in special relativity provides the crucial reason why any faster-than-light (FTL) travel creates causality problems. This formula is:

$$t_B = \beta (t_A - x \cdot v/c^2) \qquad (1.0)$$

where t_B gives time as measured by B, t_A time as measured by A, β is a factor affecting the rate at which time flows, x and v are vector distances and velocities between A and B, respectively, and c is the speed of light. These symbols are those used in most standard introductions to Special Relativity.

For FTL the term $x \cdot v/c^2$ has special significance. It means that two observers traveling at different velocities will *not* agree on the order of events happening in the Universe. Figure 2.0 shows how this can happen.

Figure 2.0:

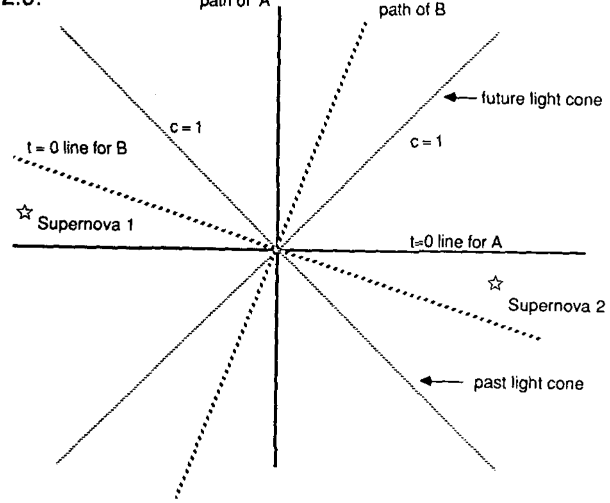


Figure 2.0: In all of these figures, Time of A is the vertical coordinate and Space (as seen by A) is the horizontal coordinate; they cross at the origin t = 0, x = 0 for A.

Note the lightly dotted line of slope 1 showing the movement of a light beam from A starting at the origin, and the second dotted line showing the movement of a light beam received by A at the origin. (In three dimensions these beams form the future light cone and the past light cone seen from the origin). The heavy dotted line labeled "Path of B" shows how B moves with respect to A.

The diagram shows how B's t = 0 line is tilted as seen by A, and why A and B will report the order of events differently.

The horizontal line is time t=0 as measured by A; note that A sees Supernova 2 as *preceding* Supernova 1. The vertical line is the path of A as seen by A (A isn't moving with respect to himself). The curved line (labeled "Path of B") shows the path of B, who *is* moving with respect to A; and the tilted line (dotted in the same way) shows the points in space-time that B sees as happening at time t = 0 (and c is set equal to 1). We notice that for B, Supernova 2 happens *after* Supernova 1. We also see that any *instantaneous* travel at B's time t = 0 will necessarily involve travel backwards or forwards in time as seen by A. (It's interesting that if the supernovas are far enough away from A and B, even small differences in velocity can cause a difference in the order with which A and B see them happening).

However, backwards time travel alone isn't enough to make a CTC. CTCs require return to their original point. Figure 2.1 shows a situation with the two ends B1 and B2 of an isolated wormhole, both moving at identical velocities (as in 2.0, A's time axis is vertical and space axis horizontal). In this case, calculations show violation of causality (i.e. CTCs) cannot occur, even with instantaneous passage through the wormhole.

But what if A and B are the ends of a wormhole and are moving with respect to one another? What if there are many wormholes A0, B0; A1,

Figure 2.1:

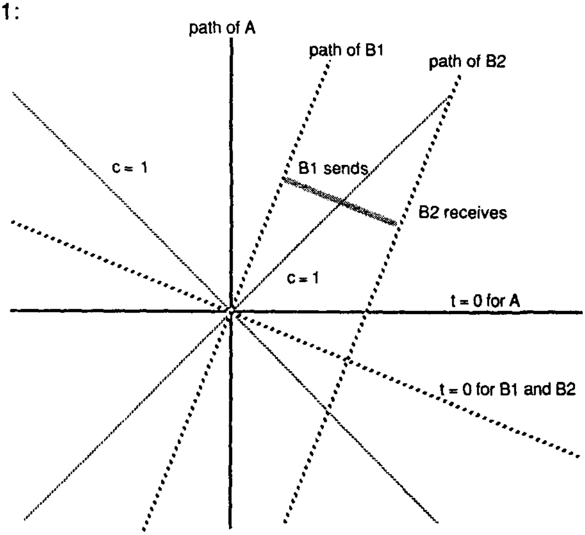


Figure 2.1: Figure 2.1 sets out a more complex situation than Figure 2.0, but with the same labeling conventions and axes. Now we have two moving observers, B1 and B2. The heavy line between them shows the path of a message sent through a wormhole; note that it goes into the *past* as seen by A, while it is simultaneous as seen by B1 and B2.

B1; A2, B2; . . . *all* moving? For physics we want a general law. We also notice that many loops will also involve positive times for passage through free space. Suppose we had a *Principle of Causality*:

Passage times from A to A through every wormhole loop and for every wormhole end A must always be nonnegative as seen by an observer at A.

If we also assume that passage times must always be the minimum possible, the principle of causality will actually assign unique passage times between every wormhole and direction. Moreover, these passage times give TRUE *faster than light movement*. But it isn't free: motion of every wormhole end affects this speed of passage.

For instance, different pairs of wormholes A1-B1 and A2-B2 will change traversal times of *one another* in a way which depends on their distance from one another. If far enough apart, each pair will have no effect on the other. If relative velocities between any group of wormholes far away from all others are low, in-group passage times will approach zero.

But the principle of causality still produces some strange behavior. Figure 2.2 shows the principle of causality for a single isolated wormhole pair A and B, with B moving *toward* A at relativistic velocity. In each case, the *receiver* A or B measures an instantaneous passage time of their message to the other, while the *sender* sees the message as taking positive time. But if B moves *away* from A, it is the *sender* who sees the message as instantaneous.

Figure 2.2:

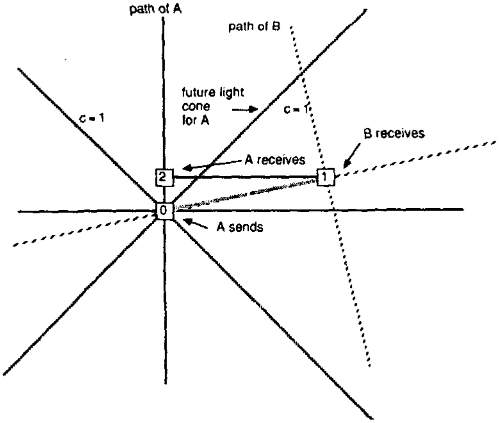


Figure 2.2: Figure 2.2 shows an even more complex situation, again with the same axes and labeling conventions. This time there is a wormhole between A and B, and A sends a message to B along the heavy line. B then returns this message to A instantaneously (as seen by A). Note that neither the forward *nor* the return messages go backwards in time as seen by *either* A or B, i.e. this wormhole satisfies the Principle of Causality. (And note also how the time of passage differs with direction!)

Figure 2.2 also shows us something else even more odd about these causal wormholes. If someone goes through the wormhole from A to B, they come out of the wormhole at B after one time lapse t1. If he or she returns from B to A, he or she comes out at a different time lapse t0. Time taken to go through the wormhole depends on relative direction of motion!

So traversable wormholes of any kind will lead to strange behavior. For now, you can take your pick.

passages through a wormhole must fulfill. Box 2 briefly discusses these causal wormholes and how passage times through them might act. It may also answer a question Thorne and Morris don't discuss: since relativity does not allow a universal Time, just what principles might control passage times when the two ends of a wormhole move at *different* velocities?

The odd geometry of causal wormholes may give only one case of something more general. To do quantum theory on the geometry of our Universe we inevitably find ourselves constructing various kinds of "integrals over all possible space-times." Many authors, including Coleman, who do so decide to ignore their urge to make a strict mathematical definition of what an "integral over all possible space-times" might mean.

One author, JB Hartle [19], has worked out a precise mathematical definition. His definition, however, suggests that we must admit new kinds of objects into our idea of possible universes. One instance of these would be cusps, points of lower dimension, and other locations where space-time no longer remained smooth. (Hartle himself considers these universes more as mathematical conveniences: but the suggestion that they might turn out to be real seems unavoidable).

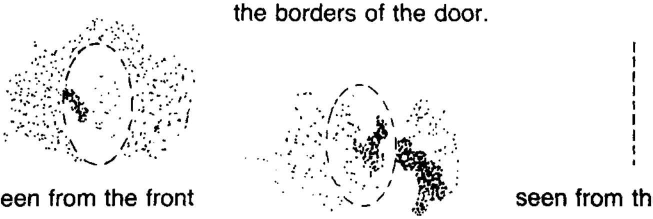
If space-time need not remain smooth, then many different kinds of holes become possible. We might imagine, for instance, flat holes in space (doors, not wormholes) for which your destination differed depending upon the direction in which you entered them (see Figure 3.0). If stars in the destination looked like those in our own Universe, doors would seem invisible until you passed through one, or came close enough to notice a discontinuity. And as in Figure 3.2, if you went through in the same direction repeatedly, you need not ever return to the universe you left.

The Vastness of the Universe

Now in the late 20th century we have many ideas about how the far regions of the Universe relate to one another and to ourselves. We think we know almost all there is to know—just a little more, and it will all become clear. Yet just as everyone before us in history, we have explored only a tiny part of our Universe. In this article I have collected only a few ideas about what we may learn in the future, to overturn all our secure beliefs about the Universe around us.

Figure 3.0:

In each case, the dotted lines are really invisible. They are there to show the borders of the door.



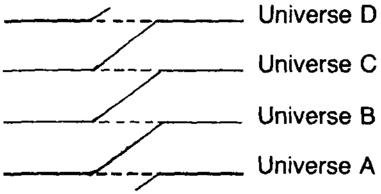
seen from the front

seen from the back

seen from the side

Figure 3.0: *Doors in Space* In general relativity space-time must be smooth. If we allow a wider range of possible spaces for our quantum calculations, new phenomena can happen. In Figure 3.0 we see a *door*, passing through it you find yourself in another universe. This door would be invisible if looked at from the side.

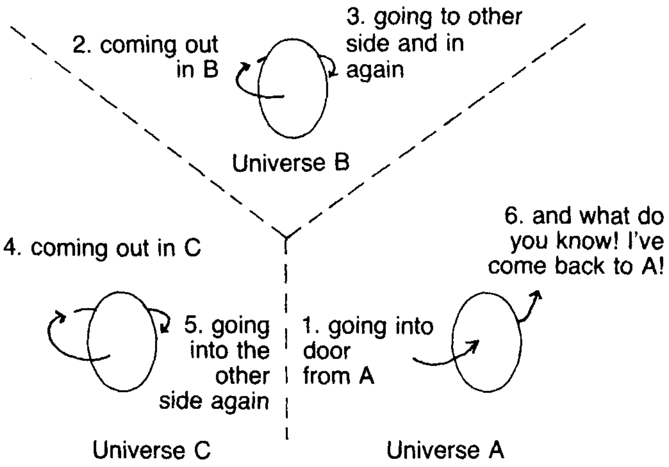
Figure 3.1: This diagram represents doors as resembling a staircase between Universes. The difference, of course, is that there are no "stairs." By stepping through a door in Universe A, you find yourself in Universe B, and so on.



What happens if we went around to the other side, behind it? We might for instance see another quite different universe, as in Figure 3.0. To understand the possibilities, imagine a staircase, as shown in Figure 3.1. Each time you went around to the other side, you would find a door to yet another universe immediately on stepping through. But like a staircase, you must first go around to the other side in order to go up another flight).

Figure 3.2 shows one of the possibilities for these doors. In Figure 3.2 you start in Universe A.Going through a door, you find yourself in Universe B. Then you go round to the other side and go through again, to find yourself in Universe C. But when you try that again, from Universe C, you find yourself back in Universe A again, coming out from the back side of the door in Universe A.

Figure 3.2: Going around the Universes from A to C in 6 steps. And finding you've come back again.


2. coming out in B
3. going to other side and in again
Universe B
4. coming out in C
6. and what do you know! I've come back to A!
5. going into the other side again
1. going into door from A
Universe C
Universe A

Clearly the number of universes need not be only 3: it could go into millions or billions. And there is a final possibility: instead of returning to Universe A, perhaps your passage through the door could go on forever, without ever returning.

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THE ANALYTICAL

Thank you once more for your votes in our annual poll on the previous year's issues. This is the most meaningful way you have to convey your appreciation to the authors and artists who do an especially good job of entertaining you; and the more votes we get, the more meaningful it is. The turnout this year was better than last year, and we hope next year will be even better. The feedback your votes provide helps *you* by giving us a better feel for what you like and don't like—which gives us a better idea of what to offer you in the future.

To review the procedure, we have four categories: novellas and novelettes (one category), short stories, fact articles, and covers. In each category, we asked you to list your three favorite items, in descending order of preference. Each first place vote counts as three points, second place two, and third place one. The total number of points for each item is divided by the maximum it *could* have received (if everyone had ranked it #1) and multiplied by 10. The result is the score listed below, on a scale of 0 (nobody voted for it) to 10 (everybody ranked it first). In practice, scores run lower in categories with many entries than in those with only a few. For comparison, we've listed in parentheses at the head of each category the score every item would have received had all been equally popular.

NOVELLAS AND NOVELETTES (0.59)

1. "Poles Apart," G. David Nordley (2.52)
2. "Captive Dreams," Michael F. Flynn (1.17)
3. "Blood Relations," Julia Ecklar (1.05)
4. (tie) "Because It's There," Rick Shelley & Lee Goodloe (0.98)
    "The Walking Hills," William E. Cochrane (0.98)
5. "Tranquillity Rose," Stephen L. Burns (0.93)

LABORATORY

SHORT STORIES (0.57)

1. "Love, Dad," Jeffery D. Kooistra (2.07)
2. "Stranger Things," Amy Bechtel (1.38)
3. "Bushido," Ben Bova (1.15)
4. "Steelcollar Worker," Vonda N. McIntyre (1.13)
5. "Change of Life," L.A. Taylor (0.99)

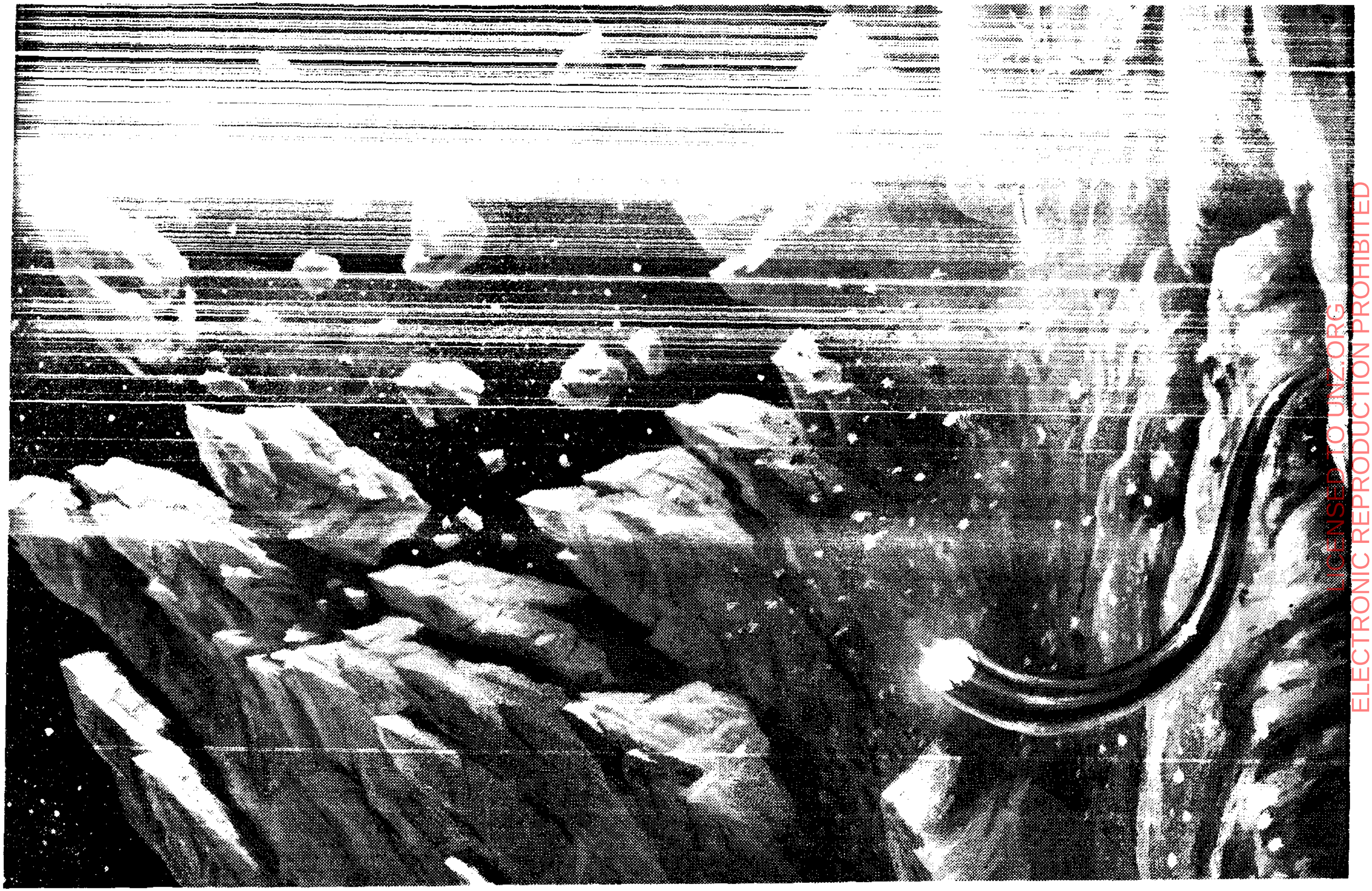
FACT ARTICLES (1.54)

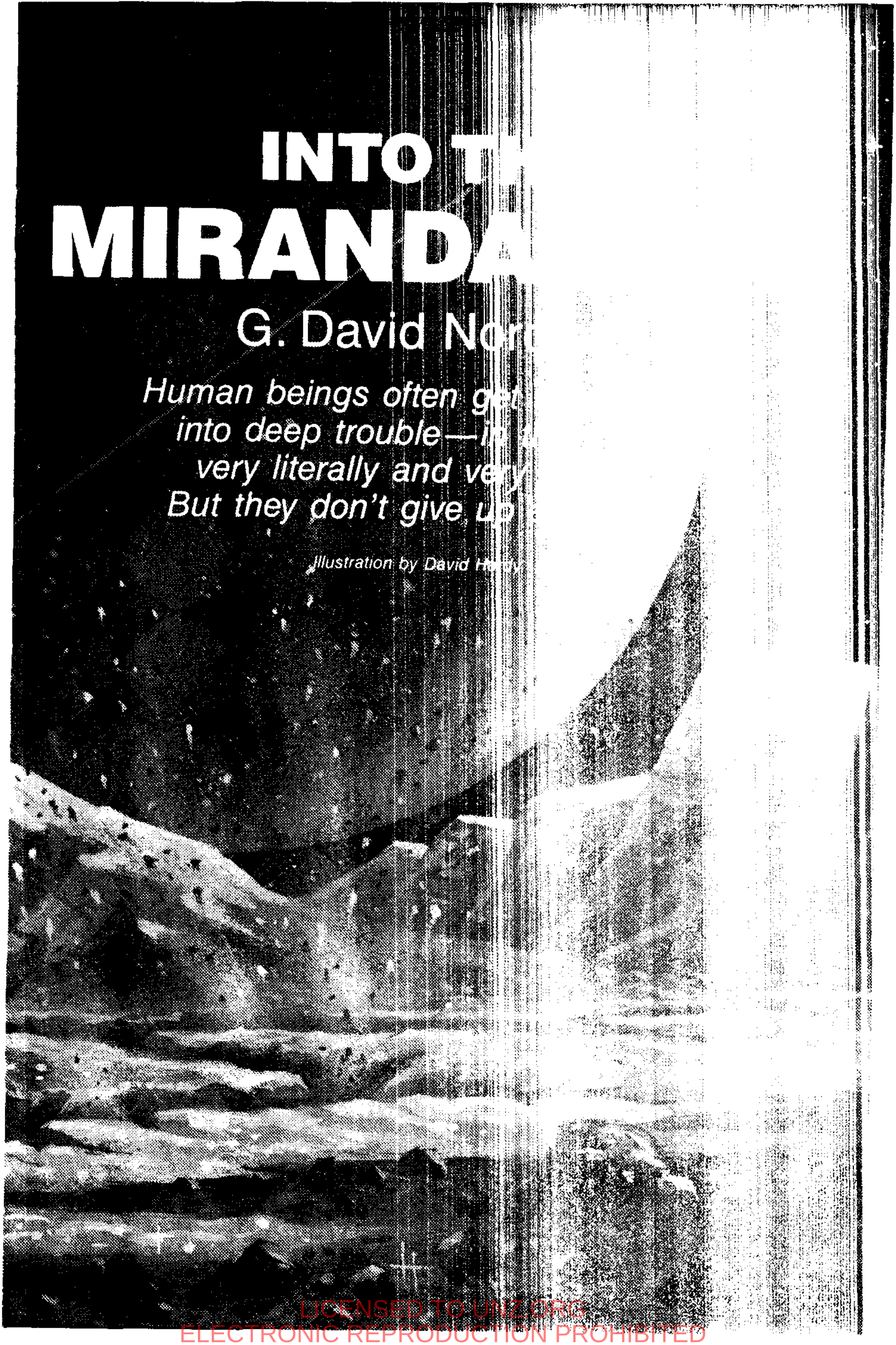
1. "The Demon Under Hawaii," Geoffrey A. Landis (2.56)
2. "Manufacturing Magic," Arlan Andrews (2.26)
3. "Chicxulub: The Smoking K-T Gun?," Stephen L. Gillett, Ph.D. (2.08)
4. "The Magnetic Sail," Robert M. Zubrin (2.05)
5. "A Visit to Suprajupiter," Paul Birch (1.49)

COVERS (1.54)

1. July: Bob Eggleton, for "Because It's There" (3.33)
2. Mid-December: Jim Burns, for "Poles Apart" (2.88)
3. October: Nicholas Jainschigg, for "Ice Nights" (2.30)
4. November: Bob Eggleton, for "Embracing the Alien" (2.15)
5. March: David Hardy, for "Landfall" (1.77)

This year the two fiction categories each had a clear, strong winner, with tight competition among some highly deserving runners-up. Among covers and fact articles, competition was fairly tough even at the top. And this year we have one "honorable mention" in a new category: Roger Mouton, of Orlando, Florida, gets one year's subscription free because his ballot was drawn for that honor from among all those submitted. Remember, next year that could be you!





INTO T

MIRANDA

G. David Nor

Human beings often ge
into deep trouble—i
very literally and ve
But they don't give u

Illustration by David H

I

This starts after we had already walked, crawled, and clawed our way fifty-three zig-zagging kilometers into the Great Miranda Rift, and had already penetrated seventeen kilometers below the mean surface. It starts because the mother of all Mirandaquakes just shut the door behind us and the chances of this being rescued are somewhat better than mine; I need to do more than just take notes for a future article. It starts because *I have faith in human stubbornness*, even in a hopeless endeavor; and I think the rescuers will come, eventually. I am Wojciech Bubka and this is my journal.

Miranda, satellite of Uranus, is a cosmic metaphor about those things in creation that come together without really fitting, like the second try at marriage, ethnic integration laws, or a poet trying to be a science reporter. *It was blasted apart by something* a billion years ago and the parts drifted back together, more or less. There are gaps. Rifts. Empty places for things to work their way in that are not supposed to be there; things that don't belong to something of whole cloth.

Like so many great discoveries, the existence of the rifts was obvious after the fact, but our geologist, Nikhil Ray, had to endure a decade of derision, several rejected papers, a divorce from a wife unwilling to share academic ridicule, and public humiliation in the pop science media—before the geology establishment finally conceded that what the seismological network on Miranda's surface had found had, indeed, confirmed his work.

Nikhil had simply observed that although Miranda appears to be made of the same stuff as everything else in the Uranian system, the other moons are just under twice as dense as water while Miranda is only one and a third times as dense. More ice and less rock below was one possibility. The other possibility, which Nikhil had patiently pointed out, was that there could be less of *everything;* a scattering of voids or bubbles beneath.

So, with the goat-to-hero logic we all love, when seismological results clearly showed that Miranda was laced with substantial amounts of nothing, Nikhil became a minor Solar System celebrity, with a permanent chair at Coriolis, and a beautiful, high strung, young renaissance woman as a trophy wife.

But, by that time, I fear there were *substantial empty places in Nikhil*, too.

Like Miranda, this wasn't clear from his urbane and vital surface when we met. He was tall for a Bengali, a lack of sun had left his skin with only a tint of bronze, and he had a sharp face that hinted at an Arab or a Briton in his ancestry; likely both. He moved with a sort of quick, decisive energy that nicely balanced the tolerant good-fellow manners of an academic aristocrat in the imperial tradition. If he now distrusted people in general, if he kept them all at a pleasantly formal distance, if he harbored a secret contempt for his species, well, this had not been apparent to Catherine Ray, M.D., who had married him after his academic rehabilitation.

I think she later found the emptiness within him and part of her had recoiled, while the other, controlling, part found no objective reason to leave a relationship that let her flit around the top levels of Solar System academia. Perhaps that explained why she chose to go on a fortnight of exploration with someone she seemed to detest; oh, the stories she would tell. Perhaps that explained her cynicism. Perhaps not.

We entered the great rift three days of an age ago, at the border of the huge chevron formation: the rift where two dissimilar geologic structures meet, held together by Miranda's gentle gravity and little else. Below the cratered, dust choked surface, the great rift was a network of voids between pressure ridges; rough wood, slap-glued together by a lazy carpenter on a Saturday night. It could, Nikhil thinks, go through the entire moon. There were other joints, other rifts, other networks of empty places—but this was the big one.

Ah, yes, those substantial amounts of nothing. As a poet, I was fascinated by contradiction and I found a certain attraction to exploring vast areas of hidden emptiness under shells of any kind.

I fill voids, so to speak. I was an explicit rebel in a determinedly impressionist literary world of artful obscurity which fails to generate recognition or to make poets feel like they are doing anything more meaningful than the intellectual equivalent of masturbation—and pays them accordingly. The metaphor of Miranda intrigued me; an epic lay there beneath the dust and ice. Wonders to behold there must be in the biggest underground system of caverns in the known Universe. The articles, interviews, and talk shows played out in my mind. All I had to do was get there.

I had a good idea of how to do that. Her name was Miranda Lotati. Four years ago, the spelunking daughter of the guy in charge of "Solar System Astrographic's" project board had been a literature student of mine at Coriolis University. When I heard of the discovery of Nikhil's mysterious caverns, it was a trivial matter to renew the acquaintance, this time without the impediments of faculty ethics. By this time she had an impressive list of caves, mountains, and other strange places to her credit, courtesy of her father's money and connections, I had thought.

She had seemed a rough-edged, prickly woman in my class, and her essays were dry condensed dullness, never more than the required length, but which covered the points involved well enough that honesty had forced me to pass her.

Now, armed with news of the moon Miranda's newly discovered caverns, I decided her name was clearly her destiny. I wasn't surprised when an inquiry had revealed no current relationship. So, I determined to create one and bend it toward my purposes. Somewhat to my surprise, it worked. Worked to the point where it wasn't entirely clear whether she was following my agenda, or I, hers.

Randi, as I got to know her, was something like a black hole; of what goes in, nothing comes out. Things somehow accrete to her orbit and bend to her will without any noticeable verbal effort on her part. She can spend a whole evening without saying anything more than "uh-huh." Did you like the Bach? Nice place you have. Are you comfortable? Do you want more? Did you like it? Do you want to do it again tomorrow?

"Uh-huh."

"Say, if you go into Miranda someone should do more than take pictures, don't you think? I've thrown a few words around in my time, perchance I could lend my services to chronicle the expedition? What do you think?"

"Uh-huh."

My contract with her was unspoken, and was thus on her terms. There was no escape. But we are complementary. I became her salesman. I talked her father into funding Nikhil, and talked Nikhil into accepting support from one of his erstwhile enemies. Randi organized the people and things that started coming her way into an expedition.

Randi was inarticulate, not crazy. She went about her wild things in a highly disciplined way. When she used words, she made lists: "Batteries, CO_2 Recyclers, Picks, Robot, Ropes, Spare tightsuits, Tissue, Vacuum tents, Medical supplies, Waste bags, etc."

Such things came to her through grants, donations, her father's name, friends from previous expeditions, and luck. She worked very hard at getting these things together. Sometimes I felt I fit down there in "etc.," somewhere between the t and the c, and counted myself lucky. If she had only listed "back door," perhaps we would have had one.

As I wrote she was lying beside me in our vacuum tent, exhausted with worry. I was tired, too.

We wasted a day, sitting on our sausage-shaped equipment pallets, talking, and convincing ourselves to move on.

Nikhil explained our predicament: Randi's namesake quivers as it bobs up and down in its not quite perfect orbit, as inclined to be different as she. Stresses accumulate over ages, build up inside and release, careless of the consequences. We had discovered, he said, that Miranda is still shrinking through the gradual collapse of its caverns during such quakes. Also, because the gravity is so low, it might take years for a series of quakes and aftershocks to play itself out. The quake danger wouldn't subside until long after we escaped, or died.

We had to make sure the front door was closed. It was—slammed shut. The wide gallery we traversed to arrive at this cavern is now a seam, a disjoint. A scar and a change of color remain to demarcate the forcible fusion of two previously separate layers of clathrate.

Sam jammed all four arms into the wall, anchored them with piton fingers, pressed part of its composite belly right against the new seam, and pinged until it had an image of the obstructed passage. "The closure goes back at least a kilometer," it announced.

The fiber optic line we have been trailing for the last three days no longer reached the surface either. Sam removed the useless line from the comm set and held it against the business end of its laser radar. "The break's about fifteen kilometers from here," it reported.

"How do you know that?" I asked.

"Partial mirror." Randi explained on Sam's behalf. "Internal reflection."

Fifteen kilometers, I reflected. Not that we really could have dug through even one kilometer, but we'd done some pretending. Now the pretense ceased, and we faced reality.

I had little fear of sudden death, and in space exploration, the rare death is usually sudden. My attitude toward the risks of our expedition was that if I succeeded, the rewards would be great, and if I got killed, it wouldn't matter. I should have thought more about the possibility of enduring a long, drawn-out process of having life slowly and painfully drain away from me, buried in a clathrate tomb.

The group was silent for a long time. For my part, I was reviewing ways to painlessly end my life before the Universe did it for me without concern for my suffering.

Then Nikhil's voice filled the void. "Friends, we knew the risks. If it's any consolation, that was the biggest quake recorded since instruments were put on this moon. By a factor of ten. That kind of adjustment," he waved his arms at obvious evidences of faults in the cavern around us, "should have been over with a hundred million years ago. Wretched luck, I'm afraid."

"Perhaps it will open up again?" his wife asked, her light features creased with concern behind the invisible faceplate of her helmet.

Nikhil missed the irony in her voice and answered his wife's question with an irony of his own. "Perhaps it will. In another hundred million years." He actually smiled.

Randi spoke softly; "Twenty days. CO_2 catalyst runs out in twenty days. We have two weeks of food at regular rations, but we can stretch that to a month or more. We have about a month of water each, depending on how severely we ration it. We can always get more by chipping ice and running it through our waste reprocessors. But without the catalyst, we can't clean air."

"And we can't stop breathing," Cathy added.

"Cathy," I asked, "I suppose it is traditional for poets to think this way, so I'll ask the question. Is there any way to, well, end this gracefully, if and when we have to?"

"Several," she replied a shrug. "I can knock you out first, with anesthetic. Then kill you."

"How?" I ask.

"Does it matter?"

"To a poet, yes."

She nodded, and smiled. "Then, Wojciech, I shall put a piton through your heart, lest you rise again and in doing so devalue your manuscripts which by then will be selling for millions." Cathy's rare smiles have teeth in them.

"My dear," Nikhil said, our helmet transceivers faithfully reproducing the condescension in his tone, "your bedside manner is showing."

"My dear," Cathy murmured, "what would you know about anything to do with a bed?"

Snipe and countersnipe. Perhaps such repartee held their marriage together, like gluons hold a meson together until it annihilates itself.

Sam returned from the "front door." "We can't go back that way, and our rescuers can't come that way in twenty days with existing drilling equipment. I suggest we go somewhere else." A robot has the option of being logical at times like this.

"Quite right. If we wait here," Nikhil offered, "Miranda may remove the option of slow death, assisted or otherwise. Aftershocks are likely."

"Aftershocks, cave-in, suffocation," Randi listed the possibilities, "or other exits."

Nikhil shrugged and pointed to the opposite side of the cavern. "Shall we?"

"I'll follow you to hell, darling," Cathy answered.

Randi and I exchanged a glance which said; thank the lucky stars for *you*.

"Maps, such as they are," Randi began. "Rations, sleep schedule, leadership, and so on. Make decisions now, while we can think." At this she looked Nikhil straight in the eye, "While we care."

"Very well then," Nikhil responded with a shrug. "Sam is a bit uncreative when confronted with the unknown, Cathy and Wojciech have different areas of expertise, so perhaps Randi and I should take turns leading the pitches. I propose that we don't slight ourselves on the evening meal, but make do with minimal snacks at other times—"

"My darling idiot, we need protein energy for the work," Cathy interrupted. "We will have a good breakfast, even at the expense of dinner."

"Perhaps we could compromise on lunch," I offered.

"Travel distance, energy level, sustained alertness."

"On the other hand," I corrected, "moderation in all things. . . ."

By the time we finally got going, we were approaching the start of the next sleep period, and Randi had effectively decided everything. We went single file behind the alternating pitch leaders. I towed one pallet. Cathy towed the other, and Sam brought up the rear.

There was a short passage from our cavern to the next one, more narrow than previous ones.

"I think . . . I detect signs of wind erosion," Nikhil sent from the lead, wonder in his voice.

"Wind?" I said, surprised. What wind could there be on Miranda?

"The collisions which reformed the moon must have released plenty of gas for a short time. It had to get out somehow. Note the striations as you come through."

They were there, I noted as I came through, as if someone had sandblasted the passage walls. Miranda had breathed, once upon a time.

"I think," he continued, "that there may be an equilibrium between the gas in Miranda's caverns and the gas torus outside the ring system. Miranda's gravity is hardly adequate to compress that very much. But a system of caverns acting as a cold trap and a rough diffusion barrier . . . hmm, maybe."

"How much gas?" I wondered.

He shook his head. "Hard to tell that from up here, isn't it?"

We pushed half an hour past our agreed-to stop time to find a monolithic shelter that might prove safe from aftershocks. This passage was just wide enough to inflate our one meter sleeping tubes end to end. We ate dinner in the one Randi and I used. It was a spare, crowded, smelly, silent meal. Even Nikhil seemed depressed. I thought, as we replaced our helmets to pump down to let the Rays go back to their tent, that it was the last one we would eat together in such circumstances. The ins and outs of vacuum tents took up too much time and energy.

We repressurized and I savored the simple pleasure of watching Randi remove her tightsuit and bathe with a damp wipe in the end of the tent. She motioned for me to turn while she used the facility built into the end of our pallet, and so I unrolled my notescreen, slipped on its headband, and turned my attention to this journal, a process of clearly subvocalizing each word that I want on the screen.

Later she touched my arm indicating that I was next, kissed me lightly and went to bed between the elastic sheets, falling asleep instantly.

My turn.

Day four was spent gliding through a series of large, nearly horizontal caverns. Miranda, it turns out, *is* still breathing. A ghost breath to be sure, undetectable except with such sensitive instruments as Sam contains. But there appears to be a pressure differential; gas still flows through these caverns out to the surface. Sam can find the next passage by monitoring the molecular flow.

We pulled ourselves along with our hands, progressing like a weighted diver in an underwater cave; an analogy most accurate when one moves so slowly that lack of drag is unremarkable.

As we glided along I forgot my doom, and looked at the marbled ice around me with wonder. Randi glided in front of me and I could mentally remove her dusty coveralls and imagine her hard, lithe, body moving in its skin-hugging shipsuit. I could imagine her muscles bunch and relax in her weight-lifter's arms, imagine the firm definition of her neck and forearms. A poet herself, I thought, who could barely talk, but who had written an epic in the language of her body and its movement.

Sam notified us that it was time for another sounding and a lead change. In the next kilometer, the passage narrowed, and we found ourselves forcing our bodies through cracks that were hardly large enough to fit our bones through.

My body was becoming bruised from such tight contortions, but I wasn't afraid my tightsuit would tear;

the fabric is slick and nearly invulnerable. On our first day, Randi scared the hell out of me by taking a hard-frozen, knife-edged sliver of rock and trying to commit hari-kiri with it, stabbing herself with so much force that the rock broke. She laughed at my reaction and told me that I needed to have confidence in my equipment.

She still has the bruise, dark among the lighter, older blemishes on her hard-used body. I kiss it when we make love and she says "Uh-huh. Told you so." Randi climbed Gilbert Montes in the Mercurian antarctic with her father and brother carrying a full vacuum kit when she was thirteen. She suffered a stress fracture in her ulna and didn't tell anyone until after they reached the summit.

The crack widened and, to our relief, gave onto another cavern, and that to another narrow passage. Randi took the lead, Nikhil followed, then me, then Cathy, then Sam.

Sam made me think of a cubist crab, or maybe a small, handleless lawn mower, on insect legs instead of wheels. Articulate and witty with a full range of simulated emotion and canned humor dialog stored in its memory, Sam was our expert on what had been. But it had difficulty interpreting things it hadn't seen before, or imagining what it had never seen, and so it usually followed us.

By day's end we had covered twenty-eight kilometers and were another eighteen kilometers closer to the center. That appeared to be where the road went, though Nikhil said we were more likely to be on a chord passing fifty kilometers or so above the center, where it seems that two major blocks came together a billion years ago.

This, I told myself, is a fool's journey, with no real chance of success. But how much better, how much more human, to fight destiny than to wait and die.

We ate as couples that night, each in our own tents.

II

On day five, we became stuck.

Randi woke me that morning exploring my body, fitting various parts of herself around me as the elastic sheets kept us pressed together. Somehow, an intimate dream I'd been having had segued into reality, and I felt only a momentary surprise at her intrusion.

"You have some new bruises," I told her after I opened my eyes. Hers remained closed.

"Morning," she murmured and wrapped herself around me again. Time slowed as I spun into her implacable, devouring wholeness.

But of course time would not stop. Our helmets beeped simultaneously with Sam's wake-up call, fortunately too late to prevent another part of me from becoming part of Randi. Sam reminded us, that, given our fantasy of escaping from Miranda's caverns, we had some time to make up.

Randi popped out of the sheets and spun around airborne in a graceful athletic move, and slowly fell to her own cot in front of me, exuberantly naked, stretching like a sensual cat, staring right into my enslaved eyes.

"Female display instinct—harmless, healthy, feels good."

Harmless? I grinned and reminded her: "But it's time to spelunk."

"Roger that," she laughed, grabbed her tightsuit from the ball of clothes in the end of the tent, and started rolling it on. They go on like a pair of pantyhose, except that they are slick on the inside and adjust easily to your form. To her form. I followed suit, and we quickly depressurized and packed.

It took Sam an hour to find the cavern inlet vent, and it was just a crack, barely big enough for us to squeeze into. We spent an hour convincing ourselves there was no other opportunity, then we wriggled forward through this crack like so many ants, kits and our coveralls pushed ahead of us, bodies fitting any way we could make them fit.

I doubt we made a hundred yards an hour. Our situation felt hopeless at this rate, but Sam assured us of more caverns ahead.

Perhaps it would have been better if Nikhil had been on lead. Larger than Randi and less inclined to disregard discomfort, he would have gone slower and chipped more clathrate, which, as it turned out, would have been faster.

Anyway, as I inched myself forward, my mind preoccupied with the enigma of Randi, Miranda groaned—at least that's what it sounded like in my helmet, pressed hard against the narrow roof of the crack our passage has become. I felt something. Did the pressure against my ribs increase? I fought panic, concentrating on the people around me and their lights shining past the few open cracks between the passage and their bodies.

"I can't move." That was Cathy. "And I'm getting cold."

Our tightsuits were top of the line "Explorers," twenty layers of smart fiber weave sandwiched with an elastic macromolecular binder. Despite their thinness the suits are great insulators, and Miranda's surrounding vacuum is even better.

Usually, conductive losses to the cryogenic ice around us are restricted to the portions of hand or boot that happen to be in contact with the surface and getting *rid* of our body heat is the main concern. Thus, the smart fiber layers of our suits are usually charcoal to jet black. But if almost a square meter of you is pressed hard against a cryogenic solid, even the best million atom layer the Astrographic Society can buy meets its match, and the problem is worse, locally.

The old expression, "colder than a witches tit" might give you some idea of Cathy's predicament.

"I can't do much," I answered, "I'm almost stuck myself. Hang in there."

"Sam," Cathy gasped, her voice a battleground of panic and self control, "wedge yourself edge up in the crack. Keep it from narrowing any more."

"That's not going to work, Cathy," it replied. "I would be fractured and destroyed without affecting anything."

"Remember your laws!" Cathy shrieked. "You have to obey me. Now do it, before this crushes my ribs! Nikhil, make the robot obey me!"

"Cathy, dear," Nikhil asks, "I sympathize with your discomfort, but could you hold off for a bit? Let us think about this."

"I'll be frozen solid in minutes and you want to think. Damnit, Nikhil, it hurts. Expend the robot and save me. I'm your doctor."

"Cathy," Sam says, "We will try to save you, but we have gone only a hundred kilometers since the quake, and there may be a thousand to go. If we encounter such difficulties every hundred kilometers, there may be on the order of ten of them yet to come. And you only have one robot to expend, as you put it. Sacrificing me now places the others in an obviously increased risk. Nothing is moving now, so thinking does not entail any immediate increased risk."

"Damn your logic. I'm getting frostbite. Get me out of here!"

Embarrassed silence slammed down after this outburst, no one even breathing for what seemed like a minute. Then Cathy started sobbing in short panicky gasps, which at least let the rest of us know she was still alive.

Randi broke the silence. "Can the rest of you move forward?"

"Yes," Nikhil answers, "a little."

"Same here," I add.

"Sam," Randi ordered. "Telop bug. Rope."

"I have these things."

"Uh-huh. Have your telop bug bring the rope up to me, around Cathy. When I've got it, put a clamp on it just behind Cathy's feet."

"Yes, Randi," Sam acknowledged its orders. "But why?" It also requested more information.

"So Cathy's feet can . . . grab —uh—get a foothold on it." Randi's voice showed her frustrations with speech, but no panic. "Can you model that? Make an image? See what will happen?"

"I can model Cathy standing on a clamp on the rope, then rotate horizontal like she is, then put the passage around her. . . . I've got it!" Sam exclaimed. "The telop's on its way."

"Please hurry," Cathy sobs, sounding somewhat more in control now.

I felt the little crablike telop scuttling along through the cracks between my flesh and the rock. The line started to snake by me, a millimeter Fullerene fiber bundle that could support a dinosaur in Earth gravity, a line of ants marching on my skin. I shivered just as the suit temperature warning flashed red in my visor display. The telop's feet clicked on my helmet as it went by. I waited for what seemed hours that way.

"Grab the line." Randi commanded and we obeyed. "Feet set, Cathy?"

"I can't . . . can't feel the clamp."

"OK. I'll take up some of the, the slack . . . OK now, Cathy?"

"It's there. Oh, God I hope this works."

"Right," Randi answered. "Everyone. Grab. Heave."

I set my toe claws and gave it my best effort forward. Nothing seemed to move much.

"Damn!" Randi grunted.

"Use the robot, I'm freezing," Cathy sobbed.

"Dear," Nikhil muttered, "she *is* using the robot. She's just not *being* one."

I started to get cold myself. My toes were dug in, but I couldn't bend my knees, so everything was with the calves. If I could just get my upper legs into it, I thought. If I just had a place to stand. Of course, that was it.

"Randi," I asked, "If Cathy grabbed the rope with her hands, stood on Sam and used all of her legs? Wouldn't that make a difference?"

Her response was instantaneous. "Uh-huh. Sam, can you, uh, move up under Cathy's feet and, uh, anchor yourself."

"Do you mean under, or behind so that she can push her feet against me?"

"I meant behind, Sam. Uh," Randi struggled with words again, "uh, rotate model so feet are down to see what I see, er, imagine."

"Yes . . . I can model that. Yes, I can do that, but Cathy's knees cannot bend much."

"Roger, Sam. A little might be enough. OK, Cathy, understand?"

"Y-Yes, Randi." Seconds of scraping, silence, then "OK I've got my feet on Sam."

"Then let's try. Pull on three. One, two, three."

We all slid forward a bit this time, but not much. Still it was much more progress then we'd made in the last half hour.

"Try again." I feel her take up the slack. "One, two, three."

That time it felt like a cork coming out of the bottle.

Over the next hour, we struggled forward on our bellies for maybe another 110 meters. Then Randi chipped away a final obstruction and gasped.

Haggard and exhausted as I am, my command of the language is inadequate to my feelings as I emerged from the narrow passage, a horizontal chimney actually, onto the sloping, gravelly ledge of the first great cavern. Involuntarily, I groaned; the transition from claustrophobia to agoraphobia was just too abrupt. Suddenly, there was this immense space with walls that faded into a stygian blackness that swallowed the rays of our lights without so much as a glimmer in return.

My helmet display flashed red numbers which told me how far I would fall, some six hundred meters; how long I would fall, just over two minutes, and how fast I would hit, almost ten meters per second; a velocity that would be terminal for reasons not involving air resistance. Think of an Olympic hundred meter champion running full tilt into a brick wall. I backed away from the edge too quickly and lost my footing in Miranda's centigee gravity.

In slow frustration, I bounced; I couldn't get my clawed boots down to the surface, nor reach anything with my hands. Stay calm, I told myself, I could push myself back toward the cavern wall on the next bounce. I waited until I started to float down again and tried to reach the ledge floor with my arm, but my bounce had carried me out as well as down.

A look at the edge showed me that my trajectory would take me over it before I could touch it. There was nothing I could do to save myself—my reaction pistol was in a pallet. Visions of Wile E. Coyote scrambling in air trying to get back to the edge of a cliff went through my mind, and I involuntarily tried to swim through the vacuum—not fair, at least the coyote had air to work with.

The helmet numbers went red again as I floated over the edge. Too desperate now to be embarrassed, I found my voice and a sort of guttural groan emerged. I took another breath, but before I could croak again, Cathy grabbed my arm and clipped a line to my belt. She gave my hand a silent squeeze as, anchored firmly to a piton, I pressed my back against the wall of the cavern to get as far as I could from the edge of the ledge. I shook. Too much, too much.

I canceled any judgment I'd made about Cathy. Judge us by how far, not how, we went.

Sam told us the cavern was twenty-seven kilometers long and slanted severely downhill. Our ledge topped a six-hundred-meter precipice that actually curved back under us. We gingerly made our camp on the ledge, gratefully retreated to our piton-secured tents, and ate a double ration silently, unable to keep our minds off of the vast inner space which lay just beyond the thin walls of our artificial sanity.

Sleep will be welcome.

Day six. The inner blackness of sleep had absorbed my thoughts the way the cavern absorbed our strobes, and I woke aware of no dreams. After a warm, blousy, semiconscious minute, the cold reality of my predicament came back to me and I shivered. It had taken a full day to complete the last ten kilometers, including five hours of exhausted unconsciousness beneath the elastic sheets. We would have to make much better time than that.

That morning, Randi managed to look frightened and determined at the same time. No display behavior this morning—we dressed efficiently, packed our pallet and turned on the recompressors minutes after waking. Breakfast was ration crackers through our helmet locks.

I stowed the tent in the pallet and turned to find Randi standing silent at the edge. She held the Fullerene line dispenser in one hand, the line end in the other, snapped the line tight between them, and nodded. We had, I remembered, fifty kilometers of Fullerene line.

"Randi, you're not considering . . ."

She turned and smiled at me the way a spider smiles to a fly. Oh, yes she was.

"Preposterous!" was all Nikhil could say when Randi explained what she had in mind. Cathy, docile and embarrassed after yesterday's trauma, made only a small, incoherent, frightened giggle.

And so we prepared to perform one of the longest bungee jumps in history in an effort to wipe out the entire length of the passage in, as it were, one fell swoop. Nikhil drilled a hole through a piece of the cavern wall that looked sufficiently monolithic and anchored the line dispenser to that. Sam, who was equipped with its own propulsion, would belay until we were safe, then follow us.

Randi stretched a short line segment between two pitons and showed us how to use it to brace ourselves against the wall in Miranda's less-than-a-milligee gravity. We held our flylike position easily and coiled our legs like springs.

"Reaction pistols?" Randi asked.

"Check." Nikhil responded.

"Feet secure?"

Three "Checks" answered.

"Line secure."

Sam said "Check."

Randi cleared her throat. "On three now. One, two, *three*."

We jumped out and down, in the general direction of Miranda's center. After a brief moment of irrational fear, we collected ourselves and contemplated the wonders of relativity as we sat in free fall while the "roof" of the cavern flashed by. It was a strange experience; if I shut my eyes, I felt just like I would feel floating outside a space station. But I opened my eyes and my light revealed the jagged wall of the cavern whipping by a few dozen meters away. It was, I noted, getting closer.

Judiciously taking up the slack in our common line, Nikhil, who was an expert at this, used the reaction pistol to increase our velocity and steer us slightly away from the roof. A forest of ice intrusions, curved like elephant tusks by eons of shifting milligravity, passed by us too close for my comfort as the minuscule gravity and the gentle tugs of the reaction pistol brought us back to the center of the cavern.

We drifted. Weight came as a shock: our feet were yanked behind us and blood rushed to our heads as the slack vanished and the line started to stretch. Randi, despite spinning upside down, kept her radar pointed "down." We must have spent twenty seconds like that, with the pull on our feet getting stronger with every meter farther down. Then, with surprising quickness the cavern wall stopped rushing past us. Randi said "Now!" and released the line, leaving us floating dead in space only a kilometer or so from the cavern floor.

I expended a strobe flash to get a big picture of the cavern wall floating next to us. It looks like we are in an amethyst geode; jumbles of sharp crystals everywhere and a violet hue.

"Magnificent." Cathy said with a forced edge in her voice. Trying to make contact with us, to start to put things back on a more normal footing after yesterday, I thought.

"Time to keep our eyes down, I should think," Nikhil reminded her, and the rest of us. "Wouldn't want to screw up again, would we?"

There was no rejoinder from Cathy so I glanced over at her. Her visor was turned toward the crystal forest and apparently frozen in space. A puff from my reaction pistol brought me over to her and my hand on her arm got her attention. She nodded. The crystals were huge, and I wondered at that, too.

I checked my helmet display—its inertial reference function told me I was fifty kilometers below the surface and the acceleration due to Miranda's feeble gravity was down to seven centimeters per second squared, so when we touched down to the rugged terrain a kilometer below in just under three minutes . . . we'd hit it at 11 meters per second. I thought again of that Olympic hundred-meter dash champion running full tilt into a brick wall.

"Randi, I think we're too high." I tried to keep my voice even. This was the sort of thing we left to Sam, but he wasn't with us just now.

As if in answer, she shot a lined piton into the wall next to us, which was starting to drift by at an alarming rate.

"Swing into the wall feet first, stop, fall again," she said.

"Feet toward the wall!" Nikhil echoed as the tension started to take hold, giving us a misleading sense of down. The line gradually pulled taut and started to swing us toward the wall. Then it let go, leaving us on an oblique trajectory headed right toward the forest of crystals. Piton guns are neat, but no substitute for a hammer.

"No problems," Nikhil says. "We dumped a couple of meters per second. I'll try this time."

He shot as Randi reeled her line in.

Eventually we swung into the wall. Cathy seemed rigid and terrified, but bent her legs properly and shielded her face with her arms as the huge crystals rushed to meet us.

They shattered into dust at our touch, hardly even crunching as our boots went through them to the wall.

"What the. . . ." I blurted, having expected something more firm.

"Deposition, not extrusion?" Randi offered, the questioning end of her response clearly intended for Nikhil.

"Quite so. Low gravity hoarfrost. Hardly anything to them, was there?"

"You, you knew, didn't you?" Cathy accused, her breath ragged.

"Suspected," Nikhil answered without a trace of feeling in his voice, "but I braced just like the rest of you. Not really certain then, was I?"

"Hello everyone, see you at the bottom," Sam's voice called out, breaking the tension. Three of us strobed and spotted the robot free falling past us.

The wall on which we landed curved gently to the lower end of the cavern, so we covered the remaining distance in hundred-meter leaps, shattering crystals with each giant step, taking some sort of vandalistic delight in the necessity of destroying so much beauty. We caught up to Sam laughing.

"This way," it pointed with one of its limbs at a solid wall, "there is another big cavern, going more or less our way. It seems to be sloped about one for one instead of near vertical."

Our helmet displays reproduced its seismologically derived model which was full of noise and faded in the distance, but clearly showed the slant down.

After a couple of false leads we found a large-enough crack leading into the new gallery. Cathy shuddered as she squeezed herself in.

That cavern was a mere three kilometers deep—we could see the other end. We shot a piton gun down there, and cheered when it held; using the line to keep us centered, we were able to cross the cavern in ten minutes.

Cathy dislodged a largish boulder as she landed, and it made brittle, tinkling, ice noises as it rolled through some frost crystals.

"Hey," I said when the significance of that got through to me. "I heard that!"

"We have an atmosphere, mostly methane and nitrogen. It's about ten millibars and nearly a hundred Kelvins," Sam answered my implied question. Top-of-the-line robot, Sam.

It occurred to me then that, should we all die, Sam might still make it out. Almost certainly would make it out. So someone will read this journal.

The next cavern went down as well and after that was another. We kept going well past our planned stopping time, almost in a daze. Our hammers made echoes now, eerie high-pitched echoes that rattled around in the caverns like a steelie marble dropped on a metal plate.

We made camp only 170 kilometers above Miranda's center, eighty-five below the surface. Nikhil told us that if the rift continued like this, along a chord line bypassing the center itself, we were more than one-third of the way through, well ahead of schedule.

Randi came over to me as I hammered in the piton for a tent line and put a hand on my arm.

"Psyche tension; Cathy and Nikhil, danger there."

"Yeah. Not much to do about it, is there?"

"Maybe there is. Sleep with Cathy tonight. Get them away from each other. Respite."

I looked at Randi, she was serious. They say tidal forces that near a black hole can be fatal.

"Boys in one tent, girls in the other?"

"No. I can't give Cathy what she needs."

"What makes you think I can?"

"Care about her. Make her feel like a person."

Honestly, I was not that much happier with Cathy's behavior than Nikhil's. Though I thought I understood what she was going through and made intellectual allowances, I guess I saw her as being more of an external situation than a person to care about. What Randi was asking wouldn't come easy. Then, too, there was the other side of this strange currency.

"And you? With Nikhil?"

"Skipped a week of classes at Stanford once. Went to a Nevada brothel. Curious. Wanted to know if I could do that, if I needed to, to live. Lasted four days. Good lay, no personality." She tapped the pocket of my coveralls where my personal electronics lived, recording everything for my article. "You can use that if we get out. Secrets are a headache." She shrugged. "Dad can handle it."

"Randi . . ." I realized that, somehow, it fit. Randi seems to be in a perpetual rebellion against comfort and normalcy, always pushing limits, taking risks, seeking to prove she could experience and endure anything. But unlike some mousy data tech who composes sex thrillers on the side, Randi has no verbal outlet. To express herself, she has to live it.

"Randi, I can see that something

has to be done for Nikhil and Cathy, but this seems extreme."

"Just once. Hope." She smiled and nestled herself against me. "Just be nice. Don't worry about yourself. Let her lead. Maybe just hugs and kisses, or listening. But whatever, give. Just one night, OK? So they don't kill themselves. And us."

It took me a minute or so to digest this idea. Another thought occurred to me. Randi and I were single—not even a standard cohab file—but Nikhil and Cathy.... "Just how are you going to suggest this to them?" I asked.

Randi shook her head and looked terrified. "Not me!"

I don't think I'm going to be able to finish the journal entry tonight.

III

Day seven. Last night was an anticlimax. Nikhil thought the switch was jolly good fun, in fact he seemed relieved. But Cathy...once her nervousness had run its course, she simply melted into my arms like a child and sobbed. I lay there holding her as she talked.

Born to a wealthy Martian merchant family, she'd been an intellectual rebel, and had locked horns with the authoritarian pastoral movement there which eventually gave rise to the New Reformation. When she was fifteen, she got kicked out of school for bragging about sleeping with a boy. She hadn't, but: "I resented anyone telling me I couldn't so much that I told everyone that we did."

Her parents, caught between their customers and their daughter, got out of the situation by shipping her off to the IPA space academy at Venus L1. She met Nikhil there as an instructor in an introductory paleontology class.

She got her MD at twenty-two and plunged into archeoimmunology research. A conference on fossil disease traces linked her up with Nikhil again, who had been ducking the controversy about Miranda's internal structure by using p-bar scans to critique claims of panspermia evidence in Triton sample cores. His outcast status was an attraction for her. They dated.

When he became an instant celebrity, she threw caution to the wind and accepted his proposal. But, she found, Nikhil kept sensual things hidden deep, and there was a cold, artificial hollowness where his sense of fun should be. Cathy said they had their first erudite word fight over her monokini on their honeymoon, and they had been "Virginia Woolfing" it ever since.

"Damn dried-up stuffed-shirted bastard's good at it," she muttered as she wrapped herself around me that night. "It stinks in here, you know?" Then she fell asleep with tears in her eyes. She was desirable, cuddly, and beyond the stretch of my conscience.

That morning, when our eyes met and searched each other, I wondered if she had any expectations, and if, in the spirit of friendship, I should offer myself. But I decided not to risk being wrong, and she did nothing but smile. Except, possibly for that brief look, we were simply friends.

Randi didn't say anything about her night in Nikhil's tent; I didn't expect her to. She gave me a very warm and long hug after she talked to Cathy. We were all very kind to each other as we broke camp and began casting ourselves along a trail of great caverns with the strides of milligee giants.

Cathy passed out the last of our calcium retention pills that morning. In a week or so we would start to suffer some of the classic low gravity symptoms of bone loss and weakness. It didn't worry us greatly—that was reversible, if we survived.

At day's end, I was not physically exhausted, but my mind is becoming numb with crystal wonders. Where are these crystals coming from? Or rather where had they come from; Sam and Nikhil concurred that the existing gas flow, though surprising in its strength, is nowhere near enough to deposit these crystal forests in the few hundred million years since Miranda's remaking.

We were 150 kilometers deep now and Nikhil said these rocks must withstand internal pressures of more than ninety atmospheres to hold the caverns open. Not surprisingly, the large caverns didn't come as often now, and when they did, the walls were silicate rather than clathrate; rock slabs instead of dirty ice. I thought I heard them groan at a higher pitch last night.

"It's after midnight, universal time," Cathy announced. She seemed recovered from her near panic earlier, and ready to play her doctor role again. But there seemed something brittle in her voice. "I think we should get some sleep now." She said this as we pushed our baggage through yet another narrow crack between the Rift galleries Sam kept finding with his sonar, so Randi and I had a chuckle at the impossibility of complying with the suggestion just then. But she had a point. We had come one-half of the way through Miranda in five of our twenty days—well ahead of schedule.

Nikhil on lead, missed her humor and said: "Yes, dear, that sounds like a very good idea to me. Next gallery, perhaps."

"You humans will be more efficient if you're not tired," Sam pointed out in a jocular tone that did credit to its medical support programmers. But I thought its feigned robot chauvinism probably did not sit well with Cathy.

"We," I answered, "don't have a milligram of antihydrogen in our hearts to feed us."

"Your envy of my superior traits is itself an admirable trait, for it recognized—"

"Shiva!" Nikhil shouted from the head of our column.

"What is it?" Three voices asked, almost in unison.

"Huge. A huge cavern. I . . . you'll have to see it yourselves."

As we joined him, we found he had emerged on another ledge looking over another cavern. It didn't seem to be a particularly large one to start—our lights carried to the other side—just another crystal cathedral. Then I looked down—and saw stars. Fortunately, my experience in "Randi's Room" kept my reaction in check. I did grab the nearest piton line rather quickly, though.

"Try turning off your strobes," Nikhil suggested as we stuck our heads over the ledge again.

The stars vanished, we turned the strobes on again, and the stars came back. The human eye is not supposed to be able to detect time intervals so small, so perhaps it was my imagination. But it seemed as though the "stars" below came on just after the strobe flashed.

"Ninety kilometers," Sam said.

"Ninety kilometers!?" Nikhil blustered in disbelief, his composure still shaken. "How is this possible? Clathrate should not withstand such pressure."

Randi anchored herself, dug into the supply pallet I'd been towing, and came up with a geologist's pick. She took a swing at the ledge to which the gentle three and a half centimeters per second local gravity had settled us and a sharp plink made its way to my ears, presumably through my boots.

"Nickel iron?" Nikhil asked.

"Uh-huh. Think so," Randi answered. "Fractured, from here down."

"Maybe this is what broke Miranda up in the first place," Cathy offered.

"Pure supposition," Nikhil demurred. "Friends, we must move on."

"I know. Take samples, analyze later." Randi said. "Got to move."

"Across or down?" I asked. This wasn't a trivial question. Our plan was to follow the main rift, which, presumably, continued on the other side. But down was an unobstructed ninety kilometer run leading to the very core of the moon. I thought of Jules Verne.

"We need to get out of this moon in less than two weeks," Nikhil reminded us. "We can always come back."

"Central gas reservoir, chimneys, connected." Randi grunted.

After a nonplused minute, I understood. If we went down the chimney, our path would leave the chord for the center. The Rift is along the chord; Sam could see it in his rangings. But, not being a gas vent, it wouldn't be well enough connected to travel. We had to find another back door.

"Oh, of course," Nikhil said. "All roads lead to Rome, which also means they all go *from* Rome. The outgassing, the wind from the core, is what connected these caverns and eroded the passages enough to let us pass through. She means our best chance is to find another chimney, and the best place to do that is at the core, isn't it."

"Uh-huh," Randi answered.

No one said anything; in the silence I swore I could hear dripping, and beneath that a sort of dull throbbing that was probably my pulse. At any rate, the pure dead silence of the upper caverns was gone. I risked another peek down over the edge. What was down there?

"We have a problem," Cathy informed us. "Poison gas. The nitrogen pressure is up to a twentieth of a bar, and that's more than there was on old Mars. It's enough to carry dangerous amounts of aromatics—not just methane, but stuff like cyanogen. I don't know if anyone else has noticed it, but this junk is starting to condense on some of our gear and stink up our tents. It might get worse near the core, and I can't think of any good way to decontaminate."

"Uh, rockets," Randi broke the silence. "Sam's rockets. Our reaction pistols. Try it first."

So we did. We figured out how far to stand from the jets, how long to stand in them—enough to vaporize anything on the surface of our coveralls and equipment, but not long enough to damage it—and how many times we could do it. Sam had enough fuel for a 120 full decontaminations—more than we'd ever live to use. Cathy volunteered to be the test article, got herself blasted, then entered a tent and emerged saying it smelled just fine.

We decided to go for the core.

This close to the center of Miranda, gravitational acceleration was down to just over five centimeters per second squared, about one three-hundredth of Earth normal. Five milligees. Release an object in front of you, look away while you count one thousand one, and look back again: it will have fallen maybe the width of a couple of fingers, just floating. So you ignore it, go about other things and look back after ten minutes. It's gone. It has fallen ten kilometers and is moving three times as fast as a human can run; over thirty meters per second. That's if it hasn't hit anyone or anything yet. Low gravity, they drill you over and over again, can be dangerous.

That's in a vacuum, but we weren't in a vacuum any more. Even with the pallet gear apportioned, we each weighed less than ten newtons—about the weight of a liter of vodka back in Poland, I thought, longingly—and we each had the surface area of a small kite; we'd be lucky to maintain three meters per second in a fall at the start, and at the bottom, we'd end up drifting like snowflakes.

For some reason, I thought of butterflies.

"Could we make wings for ourselves?" I asked.

"Really, wings?" Nikhil's voice dripped with skepticism.

"Wings!" Cathy gushed, excited.

"Sheets, tent braces, tape, line. Could do." Randi offered.

"We are going to be very, very, sorry about this," Nikhil warned.

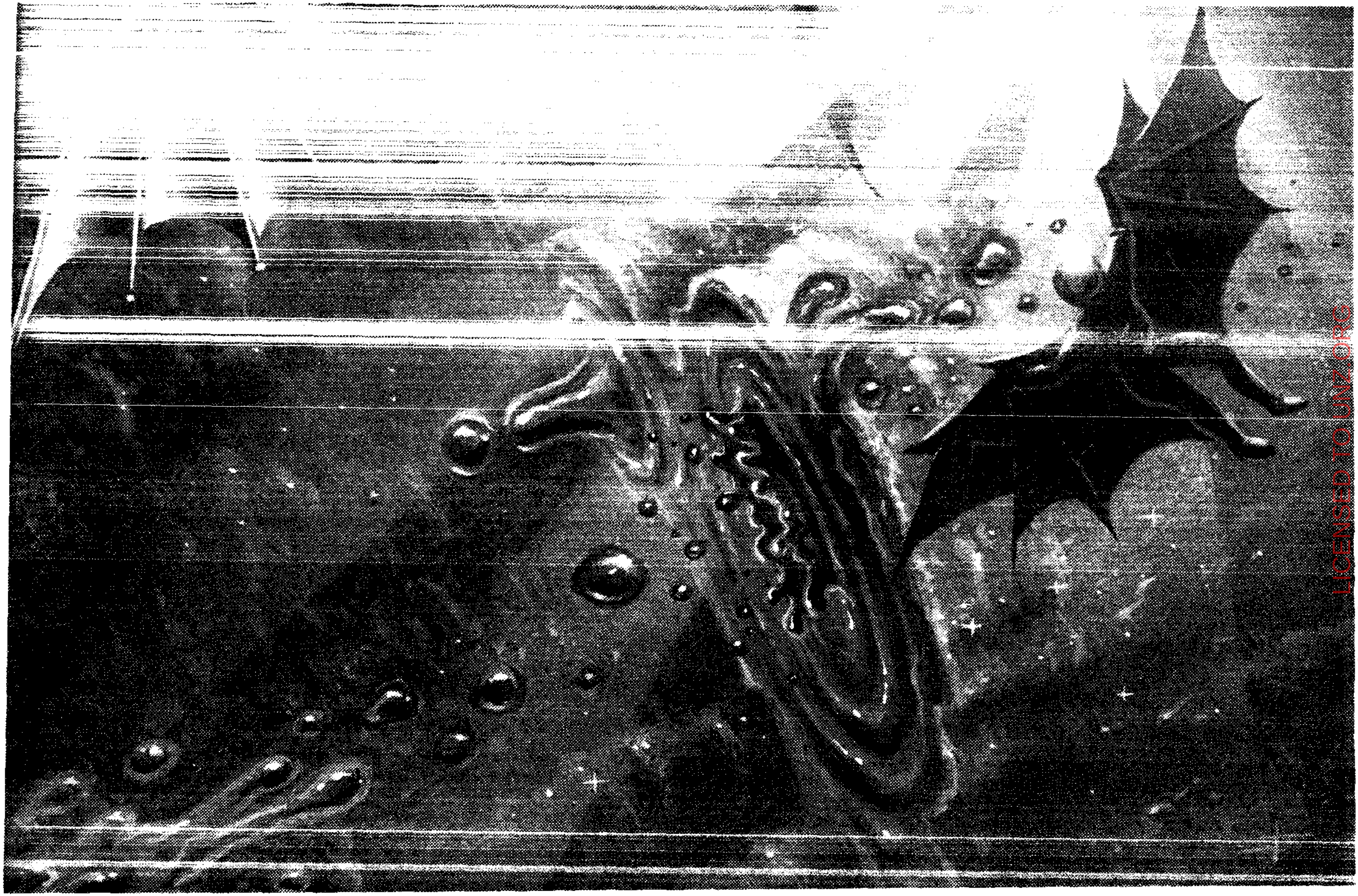
Four hours later, looking like something out of a Batman nightmare, we were ready.

Randi went first. She pushed herself away from the precipice with seeming unconcern and gradually began to drift downward. Biting my lip and shaking a bit, I followed. Then, came a stoic Nikhil and a quiet Cathy.

Ten minutes after jumping, I felt a tenuous slipstream and found I could glide after a fashion—or at least control my attitude. After some experimentation, Randi found that a motion something like the butterfly stroke in swimming seemed to propel her forward.

Half an hour down, and we found we could manage the airspeed of a walk with about the same amount of effort. Soon we were really gliding, and could actually gain altitude if we wanted.

After drifting down for another



hour we came to the source of the dripping sound I had heard the night before. Some liquid had condensed on the sides of the chimney and formed drops the size of bowling balls. These eventually separated to fall a kilometer or so into a pool that had filled in a crack in the side of the chimney The Mirandan equivalent of a waterfall looked like a time lapse splash video full of crowns and blobs, but it was at macroscale and in real time.

"Mostly ethane," Sam told us. Denser and more streamlined than we were, the robot maintained pace and traveled from side to side with an occasional blast from a posterior rocket: a "roam fart" it called it. If I ever get out of this, I will have to speak to its software engineers.

"Wojciech, come look at this!" Cathy yelled from the far side of the chimney. I sculled over, as did Randi and Nikhil.

"This had better be important," Nikhil remarked, reminding us of time. I needed one, having been mesmerized by drops that took minutes to fall and ponds that seemed to oscillate perpetually.

Cathy floated just off the wall, her position maintained with a sweep of her wings every three or four seconds. As we joined her, she pointed to a bare spot on the wall with her foot. Sticking out near the middle of it was a dirty white "T" with loopholes in each wing.

"It's a piton. It must be."

What she left unsaid was the fact that it certainly wasn't one of ours.

"Sam, can you tell how old it is?"

"It is younger than the wall. But that, however, looks to be part of the original surface of one of Miranda's parent objects. Do you see the craters?"

Now that he pointed it out, I did. There were several, very normal minicraters of the sort you find tiling the fractal surface of any airless moon, except two hundred kilometers of rock and clathrate lay between these craters and space. I had the same displaced, eerie feeling I'd had when, as a child, I had explored the top of the crags on the north rim of the Grand Canyon of the Colorado on Earth, over two thousand meters above sea level—and found seashells frozen in the rock.

"The piton," Sam added, "is younger than the hoar crystals, because the area was first cleared."

Something clicked in place for me then. The crystals surrounding the bare spot were all about a meter long. "Look at the length of the nearby crystals," I said, excited with my discovery. "Whatever cleared the immediate area must have cleared away any nearby crystal seeds, too. But just next to the cleared area it must have just pushed them down and left a base from which the crystals could regenerate. So the height of the crystals just outside the cleared area is the growth since then."

"But what do you think that growth rate is?" Nikhil asked. "We can't tell, except that it is clearly slow now. I regret to say this, because I am as interested as anyone else, but we must move on. Sam has recorded everything. If we regain the surface, other expeditions can study this. If we do not, then it does not matter. So, shall we?"

Without waiting for assent from the others, Nikhil rotated his head down and started taking purposeful wingstrokes toward the center of Miranda.

"Damn him," Cathy hissed and flew to the piton and, abandoning one wing sleeve, grabbed the alien artifact. So anchored, she put her feet against the wall it protruded from, grasped it with both hands, and pulled. Not surprisingly, the piton refused to move.

"Other expeditions. We'll come back." Randi told her.

Cathy gasped as she gave up the effort, and let herself drift down and away from the wall. We drifted with her until she started flying again. We made no effort to catch up to Nikhil, who by this time was a kilometer ahead of us.

The air, we could call it that now, was becoming mistier, foggier. Nikhil, though he still registered in my helmet display, was hidden from view. Sam's radar, sonar, filters, and greater spectral range made this a minor inconvenience for him, and he continued to flit from side to side of this great vertical cavern, gathering samples. When we could no longer see the walls, we gathered in the center. Incredibly, despite the pressure of the core on either side, the chimney widened.

"This stuff is lethal," Cathy remarked. "Everyone make sure to maintain positive pressure, but not too much to spring a leak; oxygen might burn in this. If this chimney were on Earth, the environmental patrol would demolish it."

A quick check revealed my suit was doing OK, but the pressure makeup flow was enough that I would think twice about being near anything resembling a flame. Our suits were designed, and programmed, for vacuum, not chemical warfare; we were taking them well beyond their envelope.

"Chimney needs a name." Randi said. "Uh-huh. Job for a poet, I think."

That was my cue. But the best thing I could come up with on the spot was "Nikhil's Smokestack." This was partly to honor the discoverer and partly a gentle dig at his grumpiness about exploring it. Cathy laughed, at least.

Having nothing else to look at, I asked Sam for a three-dimensional model of the chimney, which it obligingly displayed on my helmet optics. A three-dimensional cut-away model of Miranda reflected off my transparent face plate, appearing to float several meters in front of me. Our cavern was almost precisely aligned with Miranda's north pole, and seemed to be where two great, curved, hundred-kilometer chunks had come together. Imagine two thick wooden spoons, open ends facing.

These slabs were hard stuff, like nickel-iron and silicate asteroids. Theories abound as to how that could be; radioactivity and tidal stress might have heated even small bodies enough to become differentiated; gravitational chaos in the young solar system must have ejected many main belt asteroids and some might well have made it to the Uranian gravitational well; or perhaps the impact that had set Uranus to spinning on its side had released a little planetesimal core material into its moon system.

My body was on autopilot, stroking my wings every ten seconds or so to keep pace with Randi while I daydreamed and played astrogeologist, so I didn't notice the air start to clear. The mist-cloud seemed to have divided itself to cover two sides of the chimney, leaving the center relatively free. Then they thinned and through gaps, I could see what looked to be a river running . . . beside? above? below?

"Randi, I think I can see a river."

"Roger, Wojciech."

"But how can that be? How does it stay there? . . ."

"Tides."

"Yes," Nikhil added. "The chimney is almost three kilometers wide now. One side is closer to Uranus than Miranda's center of mass and moving at less than circular orbital velocity for its distance from Uranus. Things there try to fall inward as if from the apoapsis, the greatest distance, of a smaller orbit. The other side is farther away than the center and moving at greater than orbital velocity. Things there try to move outward.

"The mass of Miranda now surrounds us like a gravitational equipotential shell, essentially canceling itself out, so all that is left is this tidal force. It isn't much—a few milligees, but enough to define up and down for fluids. In some ways, this is beginning to resemble the surface of Titan, though it's a bit warmer and the air pressure is nowhere near as high."

"Is that water below us?" Cathy asked.

"No," Sam answered. "The temperature is only two hundred kelvins, some seventy degrees below the freezing point of water. Water ice is still a hard rock here."

At the bottom, or end, of Nikhil's smokestack was a three-kilometer rock, which had its own microscopic gravity field. The center of Miranda, we figured, was some 230 meters below us. Close enough we were effectively weightless. We let Sam strobe the scene for us, then set up our tents. Decontamination was a bit nervy, but most of the bad stuff was settled on either side of the tidal divide, and the air here was almost all cold dry nitrogen.

Nonetheless, set-up took until midnight, and we all turned in immediately.

It had been a very long day.

Nikhil and Cathy forgot last night that, while they were in a vacuum tent, the tent was no longer in a hard vacuum. Much of what we heard was thankfully faint and muffled but what came through in the wee small hours of the morning of day eight clearly included things like:

". . . ungrateful, arrogant pig . . ."

". . . have the self-discipline of a chimp in heat . . ."

". . . so cold and unfeeling that . . ."

". . . brainless diversions while our lives are in the balance . . ."

Randi opened her eyes and looked at me, almost in terror, then threw herself around me and clung. It might seem a wonder that this steely woman who could spit in the face of nature's worst would go into convulsions at the sound of someone else's marriage falling apart, but Randi's early childhood had been filled with parental bickering. There had been a divorce, and I gathered a messy one from a six-year-old's point of view, but she had never told me much more than that.

I coughed, loud as I could, and soon the sound of angry voices was replaced by the roar of distant ethane rapids.

Randi murmured something.

"Huh?" Was she going to suggest another respite?

"Could we be married? Us?"

It was her first mention of the subject. I'd developed my relationship with her with the very specific intention of creating and reporting this expedition, and had never, never, hinted to her I had any other designs on her person or fortune. I'd been pretty sure that the understanding was mutual.

"Uh, Randi. Look, I'm not sure we should think like that. Starving poets trying to fake it as journalists don't fit well in your social circle. Besides, that," I tossed my head in the direction of the other tent, "*that* doesn't seem to put me in the mood for such arrangements. Why—"

"Why is: you don't do that." Randi interrupted me. This was startling; she never interrupted, except in emergencies—she was the most nonverbal person I knew.

OK, I thought. This was an emergency of sorts. I kissed her on the forehead, then stifled a laugh. What a strange wife for a poet she would be! She sat there fighting with herself, struggling to put something in words.

"*Why* . . . is sex, working together, adventure, memories of this, not being afraid, not *fighting*."

My parents had had their usual share of discussions and debates, but raised voices had been very rare. The Rays' loud argument had, apparently, opened some old wounds for Randi. I held her and gave her what comfort I could. Finally, curiosity got the better of me.

"Your parents fought?"

"Dad wouldn't go to parties. Didn't like social stuff. Didn't like mom's friends. His money." Randi looked me in the eye with an expression somewhere between anger and pleading.

"So. She had him shot. Hired someone."

I'd never heard anything like that, and anything that happened to papa Gaylord Lotati would have been big news. "Huh?"

"Someone Mom knew knew someone. The punk wasn't up to it. Nonfatal chest wound. Private doctor. Private detective. Real private. A settlement. Uncontested divorce.

"I was six. All I knew then was dad was sick in the hospital for a week. Later mom just didn't come home from one of her trips. A moving van showed up and moved . . . moved some stuff. One of the movers played catch with me. Another van came and moved dad and me to a smaller house.

"And there was no more yelling, never, and no more mom. So you know now. When you hold me, that kind of goes away. I feel secure, and I want that feeling, forever."

What in a freezing hydrocarbon hell does one say to that? I just rocked her gently and stared at the wall of the tent, as if it could give me an answer. "Look, I care about you, I really do," I finally told her. "But I need to find my own 'whys.' Otherwise, the relationship would be too dependent." I grinned at her. "We should be more like Pluto and Charon, not like Uranus and Miranda."

"Who gets to be Pluto and who gets to be Charon?" she asked, impishly, eyes sparkling through embryonic tears, as she began devouring me. One does not escape from a black hole, and once I fell beneath her event horizon and we merged into a singularity, the question of who was Pluto and who was Charon, to the rest of the universe, mattered not. Nor did whatever noise we made.

We reentered the real Universe late for our next round of back-door searching; Cathy and Nikhil were almost finished packing their pallet when we emerged from our deflated tent. We stared at each other in mutual embarrassment. Nikhil put his hand on his wife's shoulder.

"Sorry. Bit of tension is all, we'll be all right." He waved at Miranda around us. "Now, shall we have another go at it?"

"Any ideas of where to look?" I asked.

"Ethane outlet?" Randi inquired.

Yes, I thought, those rivers had to go somewhere. I had, however, hoped to avoid swimming in them.

"There is," Sam announced, "a large cavern on the other side of this siderophilic nodule."

"This what?" Cathy started.

"This bloody three-kilometer nickel iron rock you're standing on," Nikhil snapped before Sam could answer, then he caught himself and lamely added: "dear."

She nodded curtly.

Randi took a couple of experimental swings at the nodule, more, I thought, in frustration than from doubting Sam. "No holes in this. Best check edges," She suggested. We all agreed.

After five hours of searching, it was clear that the only ways out were the ethane rivers.

"Forgive me if I now regret giving in on the rift route," Nikhil had to say. Cathy was in reach, so I gave her hand a pat. She shrugged.

We had a right-left choice, a coin flip. Each side of the tidal divide had it's own ethane river and each river disappeared. Sam sounded and sounded around the ethane lakes at the end of Nikhil's Smokestack. The inner one, on the side toward Uranus, appeared to open into a cavern five kilometers on the other side of "Cathy's Rock," as we called the central nodule. The other one appeared to go seven kilometers before reaching a significant opening, but that opening appeared to lead in the direction of the rift. No one even thought to question Nikhil this time.

Now that the route was decided, we had to face the question of how to traverse it.

"Simple," Cathy declared. "Sam

carries the line through, then we all get in a tent and he pulls us through."

"Unfortunately, I cannot withstand ethane immersion for that period of time." Sam said. "And you will need my power source, if nothing else, to complete the journey."

"Cathy," Randi asked. "Ethane exposure, uh, how bad?"

"You don't want to breathe much of it—it will sear your lungs."

"Positive pressure."

"Some could still filter in through your tightsuit pores."

She was right. If moisture and gas from your skin could slowly work its way out of a tightsuit, then ethane could probably work its way in.

Randi nodded. "Block tightsuit pores?"

A loud "What?" escaped me when I realized what she was considering. Tightsuits worked because they let the skin exhale: sweat and gasses could slowly diffuse through the porous, swollen, fabric. Stopping that process could be very uncomfortable—if not fatal. But Cathy Ray, MD, didn't seem to be in a panic about it. Apparently, it was something one could survive for a while.

"Big molecules. Got any, Cathy?"

"I have some burn and abrasion coating, semi-smart fibers. The brand name is Exoderm; what about it, Sam?"

"Exoderm coating will not go through tightsuit pores. But it has pores of its own, like the tightsuits, and may allow some ethane to work its way in after a while. A few thousand molecules a second per square meter."

Randi shrugged. "And a tightsuit with pores blocked will cut that way down. Too little to worry about."

"I'm going with you," I announced, surprising myself.

Randi shook her head. "You try the outer passage if I don't make it. Get the gook, Cathy."

Cathy opened up one of the pallets and produced a spray dispenser. I started unpacking a vacuum tent.

"This is going to be a little difficult to do in a tent," Cathy mused.

"Wimps. Is it ready?" Randi asked.

Cathy nodded and gave an experimental squirt to her arm. For a moment, the arm looked like it was covered with cotton candy, but the fluff quickly collapsed to a flat shiny patch. Cathy pulled the patch off and examined it. "It's working just fine, all I need is some bare skin and a place to work."

Randi answered by hyperventilating, then before anyone could stop her, she dumped pressure, fluidly removed her helmet, deactivated her shipsuit seals and floated naked before us.

Cathy, to her credit, didn't let shock stop her. "Breath out, not in, no matter how much you want," she told Randi, and quickly started spraying Randi's back while Randi was still stepping out of the boots. In less than a minute, Randi was covered with the creamy gray stuff. Calmly and efficiently, Randi rolled her tightsuit back on over the goo, resealed, checked, and rehelmeted. It was all done in less than three minutes. Nikhil was speechless and I wasn't much better.

"You OK?" I asked, though the answer seemed obvious.

Randi shrugged. "One-tenth atmosphere, ninety below, no wind, no moisture, no convection, air stings a bit. Bracing. No problem—goo handles stings. Can hold breath five minutes."

"You . . . you'd best get on with it, now," Cathy said, struggling to maintain a professional tone in her voice. "Your skin will have as much trouble breathing out as the ethane has getting in."

Randi nodded. "Line dispenser. Clips. Piton gun."

I got my act together and dug these things out of the same pallet where Cathy had kept the Exoderm. Randi snapped the free end of the line to her belt, took it off, double-checked the clip, and snapped it back on again.

"Three tugs, OK? Wait five minutes for you to collect yourselves, then I start hauling. OK?"

We nodded. Then she reached for my helmet and held it next to hers.

"I'll do it. If not, don't embarrass me, huh?"

I squeezed her hand in an extremely inadequate farewell, then she released her boot clamps, grabbed her reaction pistol, and rocketed off to the shore of the ethane lake fifteen hundred meters away.

There was, I thought, no reason why one couldn't weave a fiber-optic comm line into the test line, and use it for communications as well as for hauling, climbing, and bungee jumping. But ours weren't built that way, and we lost radio with Randi shortly after she plunged into the lake. The line kept snaking out, but, I reminded myself, that could just be her body being carried by the current. I wondered whether that had been a line attached to the alien piton we'd found above, and how long it had hung there.

Assuming success, we prepared everything for the under-ethane trip. Tents were unshipped, and pallets resealed. I broke out another line reel and looped its end through a pitoned pulley on Cathy's Rock; just in case someone did come back this way.

"I doubt that will be needed," Nikhil remarked, "but we'll be thankful if it is. You're becoming quite proficient, Mr. Bubka."

"Thanks."

I kept staring at the dispenser, fighting back the irrational desire to reel her back.

Cathy grabbed the packed pallets and moved them nearer to the shore, where the changed orientation of the milligee fields left her standing at right angles to Nikhil and myself. She chose to sit there and stare at the lake where Randi had vanished.

I stayed and puttered with my pulleys.

Nikhil came up to me. "I don't think of myself as being Bengali, you know," he said out of the blue. "I was ten when my parents were kicked out of Calcutta. Politics, I understand, though the details have never been too clear to me. At any rate, I schooled in Australia and Cambridge, then earned my doctorate at Jovis Tholus."

I knew all this, but to make conversation, responded. "J.T.U. is New Reformationist, isn't it."

"It's officially non-sectarian, state supported, you know. The council may lean that way, but the influence is diffuse. Besides, there is no such thing as New Reformationist geology, unless you're excavating the Face of Mars." Nikhil waved his hand in a gesture of dismissive toleration. "So you see, I've lived in both worlds; the cool, disciplined, thoughtful British academic world, and the eclectic, compulsive, superstitious Bengali hothouse."

No question of which one he preferred. I thought, however, to find a chink in his armor. "You are an Aristotelian then?"

"I won't object to the description, but I won't be bound by it."

"Then the golden mean must have some attraction for you, the avoidance of extremes."

"Quite."

"OK, Nikhil. Consider then, that within rational safeguards, that the spontaneity may be useful. A safety valve for evolutionary imperatives. A shortcut to communication and ideas. Creativity, art. A motivation for good acts; compassion, empathy."

"Perhaps." He gave me a wintry smile. "I am not a robot. I have these things . . ." disgust was evident in the way he said 'things,' ". . . within me as much as anyone else. But I strive to hold back unplanned action, to listen to and analyze these biochemical rumblings before responding. And I *prefer* myself that way."

"Does Cathy?"

I regretted that as soon as I said it, but Nikhil just shook his helmeted head.

"Cathy doesn't understand the alternative. I grew up where life was cheap, and pain, commonplace. I saw things in Dum Dum, horrifying things . . . but things that nevertheless have a certain fascination for me." The expression in his unblinking brown eyes was contradictory and hard to read—perhaps a frightened but curious seven-year-old peered at me from beneath layers of adult sophistication. But did those layers protect him from us, or us from him? What had Randi's night with him been like?

"Well," he continued, "Cathy will never experience that sort of thing as long as I keep a grip on myself. She means too much to me, I owe her too much." He shook his head. "If she just would not ask for what I dare not give. . . . Between us, fellow?"

I'm not sure how I should have answered that, but just then Sam told us the line had stopped reeling out, I nodded briskly to him and we glided "down" to the ethane river shore to wait for the three sharp tugs that would signal us to follow.

They didn't come. We pulled on the line. It was slack. So we waited again, not wanting to face the implications of that. I updated my journal, trying not to think about the present.

IV

It was almost the end of the schedule day when I finally told Cathy to get ready to put the Exoderm on me. There was no debate; we'd probably waited longer than we should have. "Don't embarrass me," Randi had said. Grimly, I determined to put off my grief, and not embarrass her. The fate, I recalled, of many lost expeditions was to peter out, one by one. Damn, I would miss her.

The plan had been to take the other outlet, but we silently disregarded that: I would go the same way, just in case there was any chance of a rescue. I needed that little bit of hope, to keep going.

By the laws of Murphy, I was, of course, standing stark freezing naked in ethane laced nitrogen half covered with spray gook and holding my breath when the original line went taut. Three times. Cathy and Nikhil had to help seal me back in. I was shaking so hard, almost fatally helpless with relief.

We had to scramble like hell to get Sam, Cathy, and Nikhil bagged in an uninflated tent. Since I was ready for immersion, and Randi had apparently survived said immersion, I would stay on the outside and clear us around obstacles. I was still double-checking seals as Randi started hauling. By some grace of the Universe, I had remembered to clip my pulley line to the final pallet, and it trailed us into the ethane lake.

It was cold, like skinny dipping in the Bering Sea. The ethane boiled next to my tightsuit and the space between it and my coveralls became filled with an insulating ethane froth. With that and the silvery white sheen of maximum insulation, my suit was able to hold its own at something like 290 kelvins. I shivered and deliberately tensed and relaxed every muscle I could think about, as we slipped through the ethane.

There wasn't much to see, the passage was wide, broadened perhaps by eons of flow. Strobes revealed a fog of bubbles around me, otherwise the darkness smothered everything.

The line drew us up? down? to the inside of the passage, out of the current. I grabbed the line and walked lightly against the tension of the pulling line as if I were rappelling on a low gravity world. The tent with my companions and our pallets were thus spared bumping along the rough surface.

I asked for the time display, and my helmet told me we'd been under for an hour. We rounded a corner and entered a much narrower passage. I became so busy steering us around various projections that I forgot how cold I was. But I noted my skin starting to itch.

Then I caught a flash of light ahead. Did I imagine it?

No. In much less time than I thought, the flash repeated, showing a frothy hole in the liquid above us. Then we were at the boiling surface and Randi was waving at us as she pulled us to shore.

I flew out with a kick and a flap of my hands and was in her arms. A minute must have passed before I thought to release the rest of the expedition from their tent cum submarine.

"No solid ground at the end of the main branch. I came up in a boiling sea, full of froth and foam, couldn't see anything. Not even a roof. Had to come back and take the detour." She trembled. "I have to get in a tent quick."

But with all our decontamination procedures, there was no quick about it, and it was 0300 universal on day ten before we were finally back in our tubular cocoons. By that time, Randi was moaning, shivering and only half-conscious. The Exoderm came off as I peeled her tightsuit down and her skin was a bright angry red, except for her fingers and toes, which were an ugly yellow black. I linked up the minidoc and called Cathy, who programmed a general tissue regenerative, a stimulant, and directed that the tent's insulation factor be turned up.

By 0500, Randi was sleeping, breathing normally, and some of the redness had faded. Cathy called and offered to watch the minidoc so I could get some sleep.

The question I fell asleep with was, that with everyone's lives at stake, could I have pushed myself so far?

Day ten was a short one. We were all exhausted, we didn't get started until 1500.

Randi looked awful, especially her hands and feet, but pulled on her back-up tight suit without a complaint. My face must have told her what I was thinking because she shot me a defiant look.

"I'll do my pitch."

But Cathy was waiting for us and took her back into the tent, which repressurized, Nikhil and I shrugged and busied ourselves packing everything else. When the women reappeared, Cathy declared, very firmly, that Randi was to stay prone and inactive.

Randi disagreed. "I do my pitch . . . I, I, have to."

My turn. "Time to give someone else a chance, Randi. Me for instance. Besides, if you injure yourself further, you'd be a liability."

Randi shook her head. "Can't argue. Don't know how. I don't . . . don't want to be baggage."

"I'd hardly call it being baggage," Nikhil sniffed. "Enforced rest under medical orders. Now, if you're going to be a professional in your own right instead of Daddy's little indulgence, you'll chin up, follow medical orders, and stop wasting time."

"Nikhil dear," Cathy growled, "get your damn mouth out of my patient's psyche."

Nikhil was exactly right, I thought, but I wanted to slug him for saying it that way.

"Very well," Nikhil said, evenly ignoring the feeling in Cathy's voice, "I regret the personal reference, Randi, but the point stands. Please don't be difficult."

Lacking support from anyone else, Randi's position was hopeless. She suffered herself to be taped onto a litter improvised from the same tent braces, sheets, and tape we had used earlier to make her wings.

This done, Nikhil turned to me. "You mentioned leading a pitch?"

Fortunately, the route started out like a one-third scale version Nikhil's Smokestack. It wasn't a straight shot, but a series of vertical caverns, slightly offset. Sam rocketed ahead with a line, anchored himself, and reeled the rest of us up. The short passages between caverns were the typical wide low cracks and I managed them without great difficulty, though it came as a surprise to discover how much rock and ice one had to chip away to get through comfortably. It was hard work in a pressure suit, and my respect for Nikhil and Randi increased greatly.

At the end of the last cavern, the chimney bent north, gradually narrowing to a funnel. We could hear the wind blow by us. At the end was a large horizontal cavern, dry, but full of hoar crystals. The rift was clearly visible as a fissure on its ceiling. That was for tomorrow.

The ethane level was down enough for us to forego decontamination, and before we turned in we congratulated ourselves for traversing 60 percent of the rift in less than half our allotted time.

As we turned in, Randi said she had feeling in her fingers and toes again. Which meant she must have had no feeling in them when she was demanding to lead the pitch this afternoon.

She slept quietly, it was only midnight, and I was going to get my first good night's sleep in a long time.

Day eleven was thankfully over, we were all exhausted again, and bitterly disappointed.

The day started with a discovery that, under other circumstances, would have justified the entire expedition: the mummified remains of aliens, presumably those who had left the strange piton. There were two large bodies and one small, supine on the cavern floor, lain on top of what must have been their pressure suits. Did they run out of food, or air, and give up in that way? Or did they die of something else, and were laid out by compatriots we might find elsewhere?

They were six-limbed bipeds, taller than us and perhaps not as heavy in life, though this is hard to tell from a mummy. Their upper arms were much bigger and stronger than their lower ones and the head reminded me vaguely of a Panda. They were not, to my memory, members of any of the five known spacefaring races, so, in any other circumstances, this would have been a momentous event. As it was, I think I was vaguely irritated at the complication they represented. Either my sense of wonder wasn't awake yet, or we'd left it behind, a few geode caverns back.

"How long?" Cathy asked Sam in a hushed voice. She, at least, was fascinated.

"If the present rate of dust deposition can be projected, about two hundred and thirty thousand years, with a sigma of ten thousand."

"Except for the pressure suits, they didn't leave any equipment," Nikhil observed. "I take that to mean that this cavern is *not* a dead end—as long as we do press on. You have your images, Sam? Good. Shall we?"

We turned to Nikhil, away from the corpses.

"The vent," he said, looking overhead, "is probably up there."

"The ceiling fissure is an easy jump for me," Sam offered. "I'll pull the rest of you up."

We got on our way, but the rift quit on us.

Once in the ceiling caves, we found there was no gas flowing that way, the way where Sam's seismological soundings, and our eyes, said the rift was. We chanced the passage anyway, but it quickly narrowed to a stomach-crawling ordeal. Three kilometers in, we found it solidly blocked and had to back our way out to return to the cavern. Another passage in the ceiling proved equally unpromising.

"Quakes," Nikhil said. "The rift must have closed here, oh, a hundred million years ago or so—from the dust." So, when dinosaurs ruled the Earth, Miranda had changed her maze, no doubt with the idea of frustrating our eventual expedition in mind.

Finally, Sam found the outlet airflow. It led back to the north.

"I hereby dub this the Cavern of Dead Ends," I proclaimed as we left, with what I hoped was humorous flourish.

Surprisingly, Nikhil, bless his heart, gave me one short "ha!"

Randi was not to be denied today, and took the first pitch out in relief of Nikhil. But she soon tired, according to Cathy, who was monitoring. I took over and pushed on.

The slopes were gentle, the path wide with little cutting to do, and we could make good time tugging ourselves along on the occasional projecting rock and gliding. We took an evening break in a tiny ten-meter bubble of a cavern and had our daily ration crackers, insisting that Randi have a double ration. No one started to make camp, a lack of action that signified group assent for another evening of climbing and gliding.

"We are," Sam said, showing us his map on our helmet displays, "going to pass very close to the upper end of Nikhil's Smokestack." No one said anything, but we knew that meant we were backtracking, losing ground.

There was a final horizontal cavern, and its airflow was toward the polar axis. We could pretty much figure out what that meant, but decided to put off the confirmation until the morning. I'd once read a classic ancient novel by someone named Vance about an imaginary place where an accepted means of suicide was to enter an endless maze and wander about, crossing your path over and over again until starvation did you in. There, you died by forgetting the way out. Here, we did not even know there *was* a way out.

The beginning of day twelve thus found us at the top of Nikhil's Smokestack again, on a lip of a ledge not much different than the one about a kilometer away where we had first seen it. We were very quiet, fully conscious of how much ground we had lost to the cruel calendar. We were now less than halfway through Miranda, with less than half our time left.

Sam circled the top of the Smokestack again, looking for outlets other than the one we had come through. There were none. Our only hope was to go back down.

"Do we," I asked, "try the inner river, or try the other branch of Randi's River and fight our way through the Boiling Sea?"

Nikhil, though he weighed less than four newtons, was stretched out on the ledge, resting. His radio voice came from a still form that reminded me in a macabre way of the deceased aliens back in the Cavern of Dead Ends.

"The Boiling Sea," he mused, "takes the main flow of the river, so it should have an outlet vent. It is obviously in a cavern, so it has a roof. Perhaps we could just shoot a piton up at it, blindly."

But I thought of Nikhil's Smokestack—a blind shot could go a long way in something like that.

"Sam could fly up to it," I offered. "If we protect it until we reach the Boiling Sea's surface, it could withstand the momentary exposure. Once at the ceiling, it could pull the rest of us up."

Cathy nodded and threw a rock down Nikhil's Smokestack, and we watched it vanish relatively quickly. Dense, I thought, less subject to drag. As it turned out, I wasn't the only one with that thought.

"Look what I have," Randi announced.

"What" was a large boulder, perhaps two meters across, and loose; Randi could rock it easily, thought it must have had a mass of five or six tons. "Bet *it* doesn't fall like a snowflake," she said as she hammered a piton into it.

Even in the low gravity, it took two of us to lift it over the edge.

Two hours later, about a kilometer above Cathy's Rock, we jumped off into the drag of the slipstream and watched the boulder finish its fall. It crashed with a resounding thud, shattered into a thousand shards, most of which rebounded and got caught in the chimney walls. We soon reached local terminal velocity and floated like feathers in the dust back to the place we had first departed three days ago.

Cathy decided that Randi was in no shape for another immersion and didn't think I should risk it either. I did have a few red patches, though I'd spent nowhere near as much time in the ethane as Randi. We looked at Nikhil, who frowned.

Cathy shook her head. "My turn, I think." But her voice quavered. "I'm a strong swimmer and I don't think Nikhil's done it for years. You handle the spray, Wojciech. You don't have to cover every square centimeter, the fibers will fill in themselves, but make sure you get enough on me. At least fifteen seconds of continuous spray. Randi, I can't hold my breath as long as you. You'll have to help me get buttoned up again, fast."

When all was ready, she took several deep breaths, vented her helmet and stripped almost as quickly as Randi had. This, I thought as I sprayed her, was the same woman who panicked in a tight spot just over a week ago. The whole operation was over in a hundred seconds.

The pulley I'd left was still functional, but that would only get us to the branch in the passage that led to the Cavern of Dead Ends. From there on, Cathy would have to pull us.

It was not fun to be sealed in an opaque, uninflated tent and be bumped and dragged along for the better part of an hour with no control over anything. The return of my minuscule weight as Sam winched us up to the roof of the Boiling Sea cavern was a great relief.

Randi, Nikhil, and I crawled, grumbling but grateful, out of the tent onto the floor of the cave Sam had found a couple of hundred yards from the center of the domed roof of the cavern. The floor sloped, but not too badly, and with a milligee of gravity it scarcely mattered. I helped Nikhil with the tent braces and we soon had it ready to be pressurized. Sam recharged the pallet power supplies and Randi tacked a glowlamp to the wall. Cathy then excused herself to get the Exoderm out of her tightsuit while we set up the other tent.

Work done, we stretched and floated around our little room in silence.

I took a look out the cave entrance; all I could see of the cavern when I hit my strobe was a layer of white below and a forest of yellow and white stalactites, many of them hundreds of meters long, on the roof. The far side, which Sam's radar said was only a couple of kilometers away, was lost in mist.

Then I noticed other things. My tightsuit, for instance, didn't feel as tight as it should.

"What's the air pressure in here?"

"Half a bar," Sam responded. "I've adjusted your suits for minimum positive pressure. It's mostly nitrogen, methane, ethane, and ammonia vapor, with some other volatile organics. By the way, the Boiling Sea is mainly ammonia; we are up to 220 Kelvins here. The ethane flashes into vapor as it hits the ammonia—that's why all the boiling."

Miranda's gravity was insufficient to generate that kind of pressure, and I wondered what was going on.

"Wojciech," Randi whispered, as if she were afraid of waking something. "Look at the walls,"

"Huh?" The cave walls were dirty brown like cave walls anywhere—except Miranda. "Oh, no hoar crystals."

She rubbed her hand on the wall and showed me the brown gunk.

"I'd like to put this under a microscope. Sam?"

The robot came quickly and held the sample close to its lower set of eyes. I saw what it saw, projected on the inside of my helmet.

"This," it said, "has an apparent cellular structure, but little, if any structure within. Organic molecules and ammonia in a kind of gel."

As I watched, one of the cells developed a bifurcation. I was so fascinated, I didn't notice that Cathy had rejoined us. "They must absorb stuff directly from the air," she theorized. "The air is toxic, by the way, but not in low concentrations. Something seems to have filtered out the cyanogens and other really bad stuff. Maybe this."

"The back of the cave is full of them," Randi observed. "How are you?"

"My skin didn't get as raw as yours, but I have a few irritated areas. Physically, I'm drained. We're going to stop here tonight, I hope."

"This is one of the gas outlets of the Cavern of the Boiling Sea," Sam added. "It seems to be a good place to resume our journey. The passage is clear of obstructions as far as I can see, except for these growths, which are transparent to my radar."

"They impede the airflow," Nikhil observed, "which must contribute to the high pressure in here. I think they get the energy for their organization from the heat of condensation."

"Huh?" I wracked my memories of bonehead science.

"Wojciech, when a vapor condenses it undergoes a phase change. When ethane vapor turns back into ethane, it gives off as much heat as it took to boil it in the first place. That heat can make some of the chemical reactions this stuff needs go in the right direction."

"Are they alive?" I asked.

"Hard to say," Cathy responded. "But that's a semantic discussion. Are hoar crystals alive? There's a continuum of organization and behavior from rocks to people. Any line you draw is arbitrary and will go right through some gray areas."

"Hmpf," Nikhil snorted. "Some distinctions are more useful than others. This stuff breeds, I think. Let's take some samples, but we need to get some rest, too."

"Yes, dear." Cathy yawned in spite of herself.

In the tent, Randi and I shared our last regular meal; a reconstituted chicken and pasta dish we'd saved to celebrate something. The tent stank of bodies and hydrocarbons, but we were used to that by now, and the food tasted great despite the assault on our nostrils. From now on, meals would be crackers. But we were on our way out now, definitely. We had to be. Randi felt fully recovered now and smiled at me as she snuggled under her elastic sheet for a night's rest.

It must have been the energy we got from our first good meal in days. She woke me in the middle of our arbitrary night and gently coaxed me into her cot for lovemaking, more an act of defiance against our likely fate than an act of pleasure. I surprised myself by responding, and we caressed each other up a spiral of intensity which was perhaps fed by our fear as well.

There were the tidal forces near Randi's event horizon; she was not just strong for a woman, but strong in absolute terms; stronger than most men I have known including myself. I had to half-seriously warn her to not crack our low gravity-weakened ribs. This made her giggle and squeeze me so hard I couldn't breathe for a moment, which made her giggle again.

When we were done, she gestured to the tent roof with the middle finger of her right hand and laughed uncontrollably. I joined her in this as well, but I felt momentarily sad for Nikhil and Cathy.

It was another of those polite mornings, and we packed up and were on our way with record efficiency. We looked around for the vent and Sam pointed us right at the mass of brown at the rear of the cave.

"The gas goes into that, right through it," it said.

We called the stuff "cryofungus." It had grown out from either side of the large, erosion widened vertical crack that Sam found in the back of our cave until it met in the middle. However the cryofungus colonies from either side didn't actually fuse there, but just pressed up against each other. So, with some effort, we found we could half push, half swim, our way along this seam.

We had pushed our way through five kilometers of "cryofungus" before a macabre thought occurred to me. The rubbery brown stuff absorbed organics through the skin of its cells. Did said organic stuff have to be gas? I asked Cathy.

"I did an experiment. I fed my sample a crumb of ration cracker."

"What happened?"

"The cracker sort of melted into the cryofungus. There are transport molecules all over the cell walls."

I thought a second. "Cathy, if we didn't have our suits on—"

"I'd think water would be a little hot for them, but then again water and ammonia are mutually soluble. If you want to worry, consider that your tightsuit is porous. It might," I could see her toothy smile in my mind, "help keep you moving."

"Nice, dear," Nikhil grumbled. "That gives a whole new meaning to this concept of wandering through the bowels of Miranda."

A round of hysterical laughter broke whatever tension remained between us, and resolved into a feeling of almost spiritual oneness among us. Perhaps you have to face death with someone to feel that—if so, so be it.

At the ten-kilometer point, the cryofungus started to loose its resiliency. At twelve, it started collapsing into brown dust, scarcely offering any more resistance than the hoar crystals. This floated along with the gas current as a sort of brown fog. I couldn't see, and had Sam move up beside me.

After three kilometers of using Sam as a seeing-eye dog, the dust finally drifted by us and the air cleared. It was late again, well past time to camp. We had been underground thirteen days, and had, by calculation, another eight left. According to Sam, we were still two hundred and fifteen kilometers below the surface. We decided to move on for another hour or two.

The passageway was tubular and fairly smooth, with almost zero traction. We shot pitons into the next curve ahead, and pulled ourselves along.

"Massive wind erosion," Nikhil remarked as he twisted the eye of a piton to release it. "A gale must have poured through here for megayears before the cryofungus choked it down."

Each strobe revealed an incredible gallery of twisted forms, loops, and carved rocks, many of which were eerily statuesque; saints and gargoyles. This led us into a slightly uphill kilometer-long cavern formed under two megalithic slabs, which had tilted against each other when, perhaps, the escaping gas had undermined them. After the rich hoarcrystal forest of the inbound path, this place was bare and dry. Sam covered the distance with a calculated jump carrying a line to the opposite end. We started pulling ourselves across. We'd climbed enough so that our weight was back to twenty newtons—minuscule, yes, but try pumping twenty newtons up and down for eighteen hours.

"I quit," Cathy said. "My arms won't do any more. Stop with me, or bury me here." She let go of the line, and floated slowly down to the floor.

It was silent here, no drippings, no whistling, reminiscent of the vacuum so far above. I tried to break the tension by naming the cavern. "This was clearly meant to be a tomb, anyway. The Egyptian Tomb, we can call it."

"Not funny, Wojciech," Nikhil snapped. "Sorry, old boy, a bit tired myself. Yes, we can make camp, but we may regret it later."

"Time to stop. We worked out the schedule for, for, maximum progress." Randi said. "Need to trust our judgment. Won't do any better by over-pushing ourselves now."

"Very well," Nikhil conceded, and dropped off as well. He reached Cathy and put his arm around her briefly, which I note because it was the first sign of physical affection I had seen between them. Randi and I dropped the pallets, and followed to the floor. We landed harder than we expected—milligee clouds judgment. Worse perhaps, because it combines a real up and down with the feeling that they don't matter.

We were very careful and civilized in making camp. But each of us was, in our minds, trying to reach an accommodation with the idea that, given what we had been through so far, the week we had left would not get us to the surface.

Before we went into our separate tents, we all held hands briefly. It was spontaneous, we hadn't done so before. But it seemed right, somehow, to tell each other that we could draw on each other that way.

V

That last was for day thirteen, this entry covers days fourteen and fifteen. Yes, my discipline in keeping the journal is slipping.

We'd come to think of Randi as a machine—almost as indestructible and determined as Sam, but last night, at the end of day fourteen that machine cried and shook.

Low rations and fatigue are affecting all of us now. We let Sam pull us through the occasional cavern, but it has mostly been wriggling through cracks with a human in the lead. We changed leads every time we hit a wide-enough place, but once that was six hours. That happened on Randi's lead. She didn't slack but when we finally reached a small cavern, she rolled to the side with her face to the wall as I went by. We heard nothing from her for the next four hours.

We ended up at the bottom of a big kidney-shaped cavern 160 kilometers below the surface; almost back to the depth of the upper end of Nikhil's Smokestack. We staggered through camp set-up, with Sam double-checking everything. We simply collapsed on top of the stretched sheets in our coveralls and slept for an hour or so, before our bodies demanded that we answer our needs. Washed, emptied, and a bit refreshed from the nap, Randi snuggled into my arms, then let herself go. Her body was a mass of bruises, old and new. So was mine.

"You're allowed a safety valve, you know," I told her. "When Cathy feels bad, she lets us know outright. Nikhil gets grumpy. I get silly and tell bad jokes. You don't have to keep up an act for us."

"Not for you, for, for me. Got to pretend I can do it, or I'll get left behind, with Mom."

I thought about this. A woman that would attempt to murder her husband to gain social position might have been capable of other things as well.

"Randi, what did that mean? Do you want to talk?"

She shook her head. "Can't explain."

I kissed her forehead. "I guess I've been lucky with my parents."

"Yeah. Nice people. Nice farm. No fighting. So why do you have to do this stuff?"

Why indeed? "To have a real adventure, to make a name for myself outside of obscure poetry outlets. Mom inherited the farm from her father, and that was better than living on state dividends in Poland, so they moved. They actually get to do something useful, tending the agricultural robots. But they're deathly afraid of losing it because real jobs are so scarce and a lot of very smart people are willing to do just about anything to get an Earth job. So they made themselves very, very nice. They never rock any boats. Guess I needed something more than nice."

"But you're, uh, nice as they are."

"Well trained, in spite of myself." Oh, yes, with all the protective responses a nonconformist learns after being squashed time and time again by very socially correct, outwardly gentle, and emotionally devastating means. "By the way, Randi, I hate that word."

"Huh?"

"Nice."

"But you use it."

"Yeah, and I hate doing that, too. Look, are you as tired as I am?" I was about to excuse myself to the questionable comforts of my dreams.

"No. Not yet. I'll do the work."

"Really . . ."

"Maybe the last time, way we're going." We both knew she was right, but my body wasn't up to it, and we just clung to each other tightly, as if we could squeeze a little more life into ourselves. I don't remember falling asleep.

Day fifteen was a repeat, except that the long lead shift fell on Cathy. She slacked. For seven hours, she would stop until she got cold then move forward again until she got tired. Somehow we reached a place where I could take over.

What amazed me through all of that was how Nikhil handled it. There was no sniping, no phony cheeriness. He would simply ask if she was ready to move again when he started getting cold.

We ended the day well past midnight. For some reason, I was having trouble sleeping.

Today the vent finally led us to a chain of small caverns, much like the rift before we encountered the top of Nikhil's Smokestack. We let Sam tow us most of the way and had only two long crack crawls. The good news is our CO_2 catalyst use is down from our passivity, and we might get another day out of it.

The bad news is that Randi had to cut our rations back a bit. We hadn't been as careful in our counting as we should have been, thinking that because the CO_2 would get us first, we didn't have a problem in that area. Now we did. It was nobody's fault, and everyone's. We'd all had an extra cracker here and there. They add up.

We ended up exhausted as usual, in a five-hundred-meter gallery full of jumble. I called it "The Junk Yard." Sam couldn't find the outlet vent right away, but we made such good progress that we thought we had time to catch up on our sleep.

Day eighteen. We gained a total of fifteen kilometers in radius over the past two days. "The Junk Yard" was a dead end, at least for anything the size of a human being. There was some evidence of gas diffusing upward through fractured clathrate, but it was already clear that it wasn't the main vent, which appeared to have been closed by a Miranda quake millions of years ago.

We had to go all the way back to a branch that Sam had missed while it was towing us through a medium-sized chimney. Logic and experience dictated that the outlet would be at the top of the chimney, and there was a hole there that led onward. To "The Junk Yard." Miranda rearranges such logic.

We spotted the real vent from the other side of the chimney as we rappelled back down.

"A human being," Cathy said when she saw the large vertical crack that was the real vent, "would have been curious enough to check that out. It's so deep."

"I don't know, dear," Nikhil said, meaning to defend Sam, I supposed, "with the press of time and all, I might not have turned aside, myself."

We were all dead silent at Nikhil's unintentional self-identification with a robot. Then Randi giggled and soon we were all laughing hysterically again. The real students of humor, I recall, say that laughter is not very far from tears. Then Nikhil, to our surprise, released his hold to put his arms around his wife again. And she responded. I reached out and caught them before they'd drifted down enough centimeters for their belt lines to go taut. So at the end of day seventeen, we had covered sixty kilometers of caverns and cracks, and come only fifteen or so nearer the surface.

By the end of day eighteen, we'd done an additional fifteen kilometers of exhausting crack crawling, found only one large cavern, and gave in to exhaustion, camping in a widening of the crack just barely big enough to inflate the tents.

What occurred today was not a fight. We didn't have enough energy for a fight.

We had just emerged into a ten-meter long, ten-meter wide, two-meter high widening gallery in the crack we were crawling. Cathy was in the lead and had continued on through into the continuing passage when Nikhil gave in to pessimism.

"Cathy," he called, "stop. The passage ahead is getting too narrow, it's another bloody dead end. We should go back to the last large cavern and look for another vent."

Cathy was silent, but the line stopped. Randi, sounding irritated, said "No time," and moved to enter the passage after Cathy.

Nikhil yawned and snorted. "Sorry little lady. I'm the geologist and the senior member, and not to be too fine about it, but I'm in charge." Here he seemed to loose steam and get confused, muttering "You're right about no time—there's no time to argue."

No one said anything, but Randi held her position.

Nikhil whined. "I say we go back, an' this time, back we go."

My mind was fuzzy; we still had four, maybe five days. If we found the right chain of caverns, we could still make the surface. If we kept going like this, we weren't going to make it anyway. He might be right, I thought. But Randi wouldn't budge.

"No. Nikhil. You owe me one, Nikhil, for, for, two weeks ago. I'm collecting. Got to go forward now. Air flow, striations, Sam's soundings, and, and my money, damn it."

So much for my thoughts. I had to remember my status as part of Randi's accretion disk.

"Your *daddy's* money," Nikhil sniffed, then said loudly and with false jollity, "But never mind. Come on everyone, we'll put Randi on a stretcher again until she recovers . . . her senses." He started reaching for Randi: clumsy fumbling really. Randi turned and braced herself, boots clamped into the clathrate, arms free.

"Nikhil, back off," I warned. "You don't mean that."

"Ah appreciate your expertise with words, old chap." His voice was definitely slurred. "But these are mine and I mean them. I'm too tired to be questioned by amateurs anymore. Back we go. Come on back, Cathy. As for you . . ." He lunged for Randi again. At this point I realized he was out of his mind, and possibly why.

So did Randi, for at the last second instead of slapping him away and possibly hurting him, she simply jerked herself away from his grasping fingers.

And screeched loudly in pain.

"What?" I asked, brushing by the startled Nikhil to get to Randi's side.

"Damn ankle," she sobbed. "Forgot to release my boot grapples. Tired. Bones getting weak. Too much low g. Thing hurts."

"Broken?"

She nodded, tight lipped, more in control. But I could see the tears in her eyes. Except for painkiller, there was nothing I could do for her at the moment. But I thought there might be something to be done for Nikhil. Where was Cathy?

"Nikhil," I said as evenly as I could. "What's your O_2 partial?"

"I beg your pardon?" he drawled.

"Beg Randi's. I asked you what your O_2 partial is."

"I've been conserving a bit. You know, less O_2, less CO_2. Trying to stretch things out."

"What . . . is . . . it?"

"Point one. It should be fine. I've had a lot of altitude experience—"

"Please put it back up to point two for five minutes, and then we'll talk."

"Now just a minute, I resent the implication that—"

"Be reasonable Nikhil. Put it back up for a little, please. Humor me. Five minutes won't hurt."

"Oh perhaps not. There. Now just what is it you expect to happen?"

"Wait for a bit."

We waited, silently. Randi sniffed, trying to deal with her pain. I watched Nikhil's face slowly grow more and more troubled. Finally I asked:

"Are you back with us?"

He nodded silently. "I think so. My apologies, Randi."

"Got clumsy. Too strong for my own bones. Forget it. And you don't owe me, either. Dumb thing to say. It was my choice."

What was? Two weeks ago, in his tent?

"Very well." Nikhil replied with as much dignity as he could muster.

Who besides Randi could dismiss a broken ankle with "forget it." And who besides Nikhil would take her up on that? I shook my head.

Randi couldn't keep the pain out of her voice as she held out her right vacuum boot. "This needs some work. Tent site. Cathy." Nothing would show, of course, until it came off.

"Quite," Nikhil responded. "Well, you were right on the direction. Perhaps we should resume."

I waved him off for a moment and found a painkiller in the pallet for Randi, and she ingested it through her helmet lock, and gagged a bit.

"Still a little ethane here," she gave a little laugh. "Woke me up. I'll manage."

"Let me know." I was so near her event horizon now that everything I could see of the outside world was distorted and bent by her presence. Such were the last moments of my freedom, the last minutes and the last seconds that I could look on our relationship from the outside. My independent existence was stretched beyond the power of any force of nature to restore it. Our fate was to become a singularity.

It was a measure of my own hunger and fatigue that I half seriously considered exterminating Nikhil; coldly, as if contemplating a roach to be crushed. A piton gun would have done nicely. But, I thought, Cathy really ought to be in on the decision. She might want to keep him as a pet. Cathy, of course, was on the lead pitch. That meant she was really in charge, something Nikhil had forgotten.

"Cathy," I called, laying on the irony. "Randi has a broken ankle. Otherwise, we are ready to go again."

There was no answer, but radio didn't carry well in this material—too many bends in the path and something in the clathrate that just ate our frequencies like stealth paint. So I gave two pulls on our common line to signal OK, go.

The line was slack.

Cathy, anger with Nikhil possibly clouding her judgment, had enforced her positional authority in a way that was completely inarguable: by proceeding alone. At least I fervently hoped that was all that had happened. I pulled myself to where the passage resumed, and looked. No sign of anything.

"Sam, take the line back up to Cathy and tell her to wait up, we're coming."

Sam squeezed by me and scurried off. Shortly, his monitors in my helmet display blinked out; he was out of radio range as well.

Again, we waited for a tug on a line in a silence that shouted misery. Nikhil pretended to examine the wall, Randi stared ahead as if in a trance. I stared at her, wanting to touch her, but not seeming to have the energy to push myself over to her side of the little cave.

Both hope and dread increased with the waiting. The empty time could mean that Cathy had gone much farther than our past rate of progress had suggested, which would be very welcome news. But it could also mean that some disaster ahead that had taken both her and Sam. In which case, we were dead as well. Or, like Randi's detour from the Boiling Sea, it could mean something we had neglected to imagine.

"Wojciech, Nikhil," Randi asked in her quiet, anticipatory, tone, "would you turn off your lamps?"

I looked at Nikhil, and he stared off into space, saying as much that he could not care less. But his light went out. I nodded and cut mine. The blackness was total at first, then as my pupils widened, I realized I could sense a gray-green contrast, a shadow. My shadow.

I turned around to the source of the glow. It was, of course, the crack behind me, through which Cathy and Sam had vanished. As my eyes adapted further, it became almost bright. It was white, just tinged with green. The shadows of rocks and ice intrusions made the crack look like the mouth of some beast about to devour us.

"Is there," I asked, "any reason why we should stay here?"

We left. The crack widened rapidly, and after an hour of rather mild crack-crawling, we were able to revert to our distance eating hand-hauling routine. We covered ten kilometers almost straight up this way. With the sudden way of such things the crack turned into a tubular tunnel, artificial in its smoothness, and this in turn gave into a roughly teardrop-shaped, hundred-meter-diameter cavern with slick ice walls, and a bright circle at the top. I was about to use my piton gun when Randi tugged my arm and pointed out a ladder of double-looped pitons, set about two meters apart, leading up to the circle.

We were thus about to climb into Sphereheim when Cathy's line grew taut again.

That was, by the clock, the end of day nineteen. We were, it seemed, both too exhausted and too excited to sleep.

The cavern above was almost perfectly spherical, hence the name we gave it, and was almost fifteen kilometers in diameter. A spire ran along its vertical axis from the ceiling to the floor, littered like a Christmas tree with the kind of cantilevered platforms that seventy-five milligees permits.

By now, we had climbed to within forty kilometers of the surface, so this was all in a pretty good vacuum, but there were signs that things had not always been this way.

"Cathy?" Nikhil called, the first words he had spoken since the fight.

"Good grief, you're here already. We waited until we thought it was safe."

"We saw the light."

"It came on as soon as I got in here. Sam's been looking for other automatic systems, burglar protection, for instance."

"There," Sam interjected, "appear to be none. The power source is two stage—a uranium radionic long duration module, and something like a solid state fuel cell that works when it's warmed up. The latter appears to be able to produce almost a kilowatt."

"Good," I said, wondering if Sam's software could discern the contrary irritation in my voice. "Cathy, Randi has a broken ankle." Even in less than a hundredth of *g*, Randi wouldn't put any weight on it.

"Oh, no! We need to get a tent up right away. Sam, break off and come down here, I need you. And you!" she pointed at Nikhil. "This is a medical emergency now, and what I say goes. Do you have a problem with that?" The edge in Cathy's voice verged on hysteria.

Nikhil simply turned away without saying anything and began setting up the tent.

Randi reached for Cathy. "Cathy, Nikhil cut his oxygen too thin, trying to save CO_2 catalyst for all of us. He wasn't himself. Ankle hurts like hell, but that was my fault. I'd feel better if you weren't so, uh, hard on him. OK?"

Cathy stood quietly for a couple of seconds then muttered. "All right, all right. Give me a minute to collect things, and we'll get in the tent. I'll see what I can do. Wojciech?"

"Yes, Cathy?"

"As I guess everyone knows, I just blew it with my husband, and I can't fix things right now because I have to fix Randi's ankle. He's in a blue funk." She pulled the velcro tab up on one of her pockets, reached in and produced a small, thin, box. "Give him one of these and tell him I'm sorry."

I looked at her. She seemed on the brink of some kind of collapse, but was holding herself back by some supreme effort of will. Maybe that's what I looked like to her.

"Sorry, Wojciech," she whispered, "best I can do."

I gave her hand a squeeze. "We'll make it good enough, OK? Just hang in there, Doc."

She gave me a quick, tear-filled smile, then grabbed the minidoc and followed Randi into the tent, which inflated promptly.

Nikhil was sitting on the other pallet and I sat next to him. "Look, Nikhil, the way I see it, none of this stuff counts. All that counts is that the four of us get out of this moon alive."

He looked at me briefly, then resumed looking at the ground. "No, no. Wojciech, it counts. Do you understand living death? The kind where your body persists, but everything that you thought was you has been destroyed? My reputation . . . they'll say Nikhil Ray cracked under pressure. It got too tough for old Nikhil. Nikhil beats up on women. It's going to be bloody bad."

I remembered the box Cathy gave me, pulled it out and opened it. "Doctor's orders, Nikhil. She cares, she really does."

He gave me a ghastly grin and took a caplet envelope, unwrapped it and stuck it through his helmet lock. "Can't say as I approve of mind-altering drugs, but it wouldn't do to disappoint the doctor any more now, would it? I put her through medical school, did you know? She was eighteen when we met. Biology student studying evolution, and I was co-lecturing a paleontology section. Damn she was beautiful, and no one like that had ever . . ." he lifted his hands as if to gesture, then set them down again. "I broke my own rule about thinking first, and I have this to remind me, every day, of what happens when you do that."

"Look, Nikhil. She doesn't mean to hurt you." I tried to think of something to get him out of this, to put his mind on something else. "Say, we have a few minutes. Why don't we look around, it may be the only chance we get. Soon as Cathy's done with Randi, we'll need to get some sleep, then try to make it to the surface. We've forty kilometers to go, and only two days before our catalyst runs out."

"My line, isn't that? Very well." He seemed to straighten a bit. "But it looks as if the visitors packed up pretty thoroughly when they left. Those platforms off the central column are just bare honeycomb. Of course, it would be a bit odd if they packed *everything* out."

"Oh?"

"Field sites are usually an eclectic mess. All sorts of not-immediately-useful stuff gets strewn about. If the strewers don't expect the environmental police to stop by, it usually just gets left there by the hut site—the next explorer to come that way might find something useful."

"I see. You think there might be a dump here, somewhere."

"It seems they had a crypt. Why not a dump?"

What kind of alien technology might be useful to us, I didn't know. It would take a lot longer than the two days we had to figure out how to do anything with it. But the discussion had seemed to revive Nikhil a bit, so I humored him.

We found the junkyard. It was in a mound about a hundred meters from the tower base, covered with the same color dust as everything else. A squirt from my reaction pistol blew some of the dust away from the junk.

And it was just that. Discarded stuff. Broken building panels, a few boxes with electrical leads. What looked like a busted still. A small wheeled vehicle that I would have taken for a kid's tricycle, an elongated vacuum helmet with a cracked visor. Other things. I'd been rummaging for five minutes before I noticed that Nikhil hadn't gone past the still.

"Nikhil?"

"It is within the realm of possibility that I might redeem myself. Look at that."

The most visible part was a big coil of what looked to be tubing. There were also things that looked like electric motors, and several chambers to hold distilled liquids.

"The tubing, Wojciech."

"I don't understand."

"If we breathe through it, at this temperature, the CO_2 in our breath should condense."

"Oh! We could do without the CO_2 catalyst." Then I thought of the problem. "It wouldn't be very portable."

"No, it wouldn't," Nikhil nodded slowly, judiciously. "But it doesn't have to be. Cathy and Randi can remain here while you, Sam, and I take the remaining catalyst and go for help."

Did I hear him right? Then I thought it through. Randi was disabled, Cathy, by strength and temperament, was the least suited for the ordeal above us. It made sense, but Randi would . . . no, Randi would have to agree if it made sense. She was a pro.

"We'd better see if it works first." I said.

VI

An hour later, our still was working. Tape, spare connectors, the alien light source, and Sam's instant computational capabilities yielded something that could keep two relatively quiescent people alive. They'd have to heat it up to sublimate the condensed CO_2 every other hour, or the thing would clog, but it worked.

Randi's ankle was a less happy situation.

"Randi's resting now," Cathy told us when she finally emerged from the vacuum tent, exhausted. "It's a bad break, splintered. Her bones were weak from too much time in low gravity, I think. Anyway, the breaks extend into the calcaneus and her foot is much too swollen to get back into her vacuum boots. Had to put her in a rescue bag to get out of the tent." Cathy shot a look of contempt at her husband who stared down. "The swelling will take days to go down, and she should have much more nourishment than we have to give her."

"I . . ." Nikhil started, then, in a moment I shall remember forever, he looked confused. "I?" Then he simply went limp and fell, much like an autumn leaf in the gentle gravity of Miranda, to the cavern dust. We were both too surprised to catch him even though his fall took several seconds.

"No, no . . ." Cathy choked.

I knelt over Nikhil and straightened his limbs. I couldn't think of anything else to do.

"Stroke?" I asked Cathy.

She seemed to shake herself back into a professional mode. I heard her take a breath.

"Could be. His heart telemetry's fine. Or he may have just fainted. Let's get the other tent set up."

We did this only with Sam's help. We made errors in the set-up, errors which would have been fatal if Sam hadn't been there to notice and correct them. We were tired and had been eating too little food. It took an hour. We put Nikhil in the tent and Cathy was about to follow when she stopped me.

"The main med kit's in Randi's tent. I'll need it if I have to operate. She'll have gotten out of the rescue bag to sleep after I left. You'll have to wake her, get her back in the bag and depressure—"

I held up a hand. "I can figure it out, and if I can't, she can. Cathy, her foot's busted, not her head."

Cathy nodded and I could see a bit of a smile through her faceplate.

"Randi," I called, "Sorry to wake you, but we've got a problem."

"I heard. Comsets are dumb, guys. Can't tell if you talk *about* someone instead of *to* someone. Be right out with the med kit."

"Huh?" Cathy sounded shocked. "No, Randi don't try to put that boot on. Please don't."

"Too late," Randi answered. We watched the tension go out of the tent fabric as it depressurized. Randi emerged from the opening with the med kit and a sample bag. Cathy and I immediately looked at her right boot—it seemed perfectly normal, except that Randi had rigged some kind of brace with pitons and vacuum tape.

Then we looked at the sample bag. It contained a blue-green swollen travesty of a human foot, severed neatly just above the ankle, apparently with a surgical laser. I couldn't think of anything to do or say.

"Oh, no, Randi," Cathy cried and launched herself toward Randi. "I tried Randi, I tried."

"You didn't have time." The two women embraced. "Don't say anything," Randi finally said, "to him," she nodded at Nikhil's tent, "until we're all back and safe. Please, huh?"

Cathy stood frozen, then nodded slowly, took the sample bag and examined the foot end of the section. "Looks clean, anyway. At least let me take a look at the stump before you go, OK?"

Randi shook her head. "Bitch to unwrap. Cauterized with the surgical laser. Plastiflesh all over the stump. Sealed in plastic. Plenty of local. Don't feel anything. I did a good enough job, Cathy."

I finally found my voice. "Randi . . . why?"

"Nikhil's gone. Got to move. It's OK, Wojciech. They can regenerate. You and I got to get going."

"Me? Now?" I was surprised for a moment, then realized the need. Cathy had to stay with Nikhil. And I'd already seen too many situations where one person would have been stopped that we'd managed to work around with two. Also, our jury rigged CO_2 still's capacity was two people, max.

"No. Go as long as we can, then sleep. Eat everything we have left. Push for the surface. Only way."

Cathy nodded. She handed Randi's foot to me, almost absentmindedly, and went into the tent to attend to Nikhil. Randy laughed, took the foot from me, and threw it far out of sight toward Sphereheim's junk pile. In the low gravity, it probably got there.

I tried not to think about it as Randi

and I packed, with Sam's help. Moving slowly and deliberately, we didn't make that many errors. What Randi had to draw on, I didn't know. I drew on her. In an hour, we were ready to go and said our farewells to Cathy.

She would have to wait there, perhaps alone if Nikhil did not recover, perhaps forever if we did not succeed. What would that be like, I wondered? Would some future explorers confuse her with the beings who had built the station in this cavern? Had we already done that with the corpses we found in the Cavern of Dead Ends?

I wished I had made love to Cathy that night we spent together. I felt I was leaving a relationship incomplete; a feeling, a sharing, uncommunicated. Here, even a last embrace would have been nice, but she was in her tent caring for her husband. Out of food, low on time, Randi and I had to go, and go now. In the dash to the surface, even minutes might be critical.

Tireless Sam scaled the alien tower, found the vent in the magnificent, crystal lined dome of the cavern roof, and dropped us a line. I was suspended among wonders, but so tired I almost fell asleep as Sam reeled us up. The experience was surreal and beyond description.

Of most of the next few days, I have little detailed memory. Sam dragged us through passages, chimneys, vents and caverns. Occasionally, it stopped at a problem that Randi would somehow rouse herself to solve.

On one occasion, we came to a wall a meter thick which had cracked enough to let gas pass through. Sam's acoustic radar showed a big cavern on the other side, so, somehow, we dug our way through. For all its talents, Sam was not built for wielding a pick. I leave this information to the designers of future cave exploration robots.

Randi and I swung at that wall in five-minute shifts for a three-hour eternity, before, in a fit of hysterical anaerobic energy, I was able to kick it through. We were too tired to celebrate—we just grabbed the line as Sam went by and tried to keep awake and living as it pulled us through another cave and another crack.

In one of a string of ordinary crystal caverns, we found another alien piton. Randi thought it might be a different design than the one we had found before, and had Sam pull it out and put it in a sample bag, which we stored on Sam—the most likely to survive.

I mentioned this because we were near death and knew it, but could still do things for the future. Everyone dies, I thought, so we all spend our lives for something. The only thing that matters at the end is: for what? In saving the piton, we were adding one more bit to the tally of "for what?"

This was almost certainly our last "night" in a tent. I think we both stunk, but I was too far gone to tell for sure. We'd gone for thirty-seven hours straight. Sam said we were within three kilometers of the surface, but the cavern trail lies parallel to this surface, and refused to ascend.

In theory, our catalyst was exhausted, but we continued to breathe.

Another quake trapped me.

Randi was in front of me. Somehow, she managed to squeeze aside and let Sam by to help. Sam chipped clathrate away from my helmet, which let me straighten my neck.

As this happened, there was another movement, a big slow one this time, and the groan of Miranda's tortured mantle was clearly audible as my helmet was pressed between the passage walls again. I could see the passage ahead of me close a little more with every sickening wave of ground movement, even as I could feel the pressure at my spot release a bit. But the passage ahead—if it closed with Randi on this side, we were dead.

"Go!" I told Randi. "It's up to you now." As if it hadn't always been so. I was pushed sideways and back again as another train of s-waves rolled through. Ice split with sharp retorts.

Sam turned sideways in the passage, pitting its thin composite against billions of tons of clathrate.

Randi vanished forward. "I love you," she said, "I'll make it."

"I know you will. Hey, we're married, OK?"

"Just like that?"

"By my authority as a man in a desperate position."

"OK. Married. Two kids. Deal?"

"Deal."

"I love you again."

Sam cracked under the pressure, various electronic innards spilling onto the passage floor. I couldn't see anything beyond him.

"Sam?" I asked. Useless question

"Randi?"

Nothing.

For some strange reason I felt no pressure on me now. Too worried for Randi, too exhausted to be interested in my own death, I dozed.

There was definitely CO_2 in my helmet when I woke again. It was pitch black—the suit had turned off my glowlamp to conserve an inconsequential watt or two. Groggy. I thought turning on my pack would help my breathing, vaguely thinking that the one percent weight on my lungs was a problem. To my surprise, I could actually turn.

In the utter dead black overhead, a star appeared. Very briefly, then I blinked and it vanished.

I continued to stare at this total darkness above me for minutes, not daring to believe I'd seen what I thought I'd seen, and then I saw another one. Yes, a real star.

I thought that could only mean that a crack to the surface had opened above me; incredibly narrow, or far above me, but open enough that now and then a star drifted by its opening. I was beyond climbing, but perhaps where photons could get in, photons could get out.

Shaking and miserable, I started transmitting.

"Uranus Control, Uranus Control, Wojciech Bubka here. I'm down at the bottom of a crack on Miranda. Help. Uranus Control, Uranus

Control. . . ."

Something sprayed on my face, waking me again. Air, and mist as well.

I opened my eyes and saw that a tube had cemented itself to my faceplate and drilled a hole through it to admit some smaller tubes. One of these was trying to snake its way into my mouth. I opened to help it, and got something warm and sweet to swallow.

"Thanks," I croaked, around the tube.

"Don't mention it," a young female voice answered, sounding almost as relieved as I felt.

"My wife's in this passage, somewhere in the direction my head is pointed. Can you get one of these tubes to her?"

There was a hesitation. "Your wife."

"Miranda Lotati," I croaked. "She was with me. Trying to get to the surface. Went that way."

More hesitation.

"We'll try, Wojciech. God knows we'll try."

Within minutes, a tiny version of Sam fell on my chest and scuttled past Sam's wreckage down the compressed passage in her direction, trailing a line. The line seemed to run over me forever. I remember reading somewhere that while the journey to singularity is inevitable for someone passing into the event horizon of a black hole, as viewed from our Universe, the journey can take forever.

What most people remember about the rescue was the digger; that vast thing of pistons, beams, and steel claws that tore through the clathrate rift like an anteater looking for ants. What *they* saw, I assure you, was in no way as impressive, or scary, as being directly under the thing.

I was already in a hospital ship bed when they found Randi, eleven kilometers down a passage that had narrowed, narrowed, and narrowed.

At its end, she had broken her bones forcing herself through one more centimeter at a time. A cracked pelvis, both collarbones, two ribs, and her remaining ankle.

The last had done it, for when it collapsed she had no remaining way to force herself any farther through that crack of doom.

And so she had lain there, and, minute by minute, despite everything, willed herself to live as long as she could.

Despite everything, she did.

They got the first tubes into her through her hollow right boot and the plastiflesh seal of her stump, after the left foot had proved to be frozen solid. They didn't tell me at first—not until they had convinced themselves she was really alive.

When the rescuers reached Cathy and Nikhil, Cathy calmly guided the medic to her paralyzed husband, and as soon as she saw that he was in good professional hands, gave herself a sedative, and started screaming until she collapsed. She wasn't available for interviews for weeks.

But she's fine now, and laughs

about it. She and Nikhil live in a large university dome on Triton and host our reunions in their house, which has no roof—they've arranged for the dome's rain to fall elsewhere.

Miranda, my wife, spent three years as a quadruple amputee, and went back into Miranda the moon that way, in a powered suit, to lead people back to the Cavern of Dead Ends. Today, it's easy to see where the bronze weathered flesh of her old limbs ends and the pink smoothness of her new ones start. But if you miss it, she'll point it out with a grin.

So, having been to hades and back, are the four of us best friends? For amusement, we all have more congenial companions. Nikhil is still a bit haughty, and he and Cathy still snipe at each other a little, but with smiles more often than not. I've come to conclude that, in some strange way, they need the stimulation that gives them, and a displacement for needs about which Nikhil will not speak.

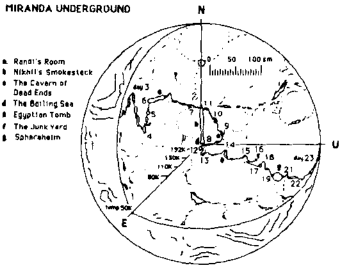
Cathy and Randi still find little to talk about, giving us supposedly verbally challenged males a chance. Nikhil says I have absorbed enough geology lectures to pass doctorate exams; so maybe I will do that someday. He often lectures me toward that end, but my advance for our book was such that I won't have to do anything the rest of my life, except for the love of it. I'm not sure I love geology.

Often, on our visits, the four of us simply sit, say nothing, and do nothing but sip a little fruit of the local grape, which we all enjoy. We smile at each other and remember.

But don't let this studied difference of ours fool you. The four of us are bound with something that goes far beyond friendship, far beyond any slight conversation, far beyond my idiot critiques of our various eccentric personalities or of the hindsight mistakes of our passage through the Great Miranda Rift. These are the table crumbs from a feast of greatness, meant to sustain those who follow.

The sublime truth is that when I am with my wife, Nikhil, and Cathy, I feel elevated above what is merely human. *Then* I sit in the presence of these demigods who challenged, in mortal combat, the will of the Universe—and won. ■

The author would like to acknowledge the inspiration of Fritz Leiber ("A Pail of Air"), Hal Clement (Still River) *and, of course, Jules Verne* (A Journey to the Center of the Earth).



Kent Patterson

DEFEND WITH THE UTMOST ENDEAVOR

The best qualifications for a job don't always equate to familiarity with the latest gadgets. . . .

Illustration by Randy Asplund-Faith

"A historian going to Mars? Say, now isn't the colony getting hot for culture lately? Next thing you know, we'll be shipping them French berets and silk lace nighties," said Bok Neilson, captain of the Trans-Solar Industries *Martian Container Transport #6*. "History! Damn sight better to teach them something they can use. Off Earth is no place for a bunch of swank pseudo-intellectuals."

Marshall Sequoia could think of absolutely nothing to say. As a matter of fact, aboard the *Container #6* he felt every bit as useless as Bok said. Silently, he followed Bok down a corridor so narrow his knuckles brushed each side. A dim light threw shadows striding like giants before them, and each step squelched as their sticky boots grasped the floor. Marshall carefully made sure one foot stuck firmly before he lifted the other. The *Container #6* was under slow acceleration, making just enough gravity to trick the unwary.

"Well, it's nothing so grandiose," Marshall said. "I'm just a history teacher at the new Martian Academy. It's too expensive to send the young ones to Earth for an education." Marshall smiled. For the six months passage to the Mars Colony, Bok would be his lord and master. Just keep smiling. No matter what.

The air reeked of stale bodies and the deodorant intended to disguise the smell. It would have stumped Aristotle to have proved one was better than the other.

Marshall could have endured the ribbing more easily had Bok been a complete blowhard, but the man knew his business. Like most space pros, he looked like a retired jockey, standing only to Marshall's shoulder with hardly a gram of fat on his muscular frame. Trans-Solar Industries didn't waste fuel moving fat employees. Marshall kept whacking his head on the ceiling of the made-for-midgets hallways. Both men wore the standard uniform, bright rescue-visibility orange pressure suit with a plastic hood hanging from around the neck, and an emergency life support pack topped by a strong anchoring cord rolled in a plastic donut. In case of a sudden pressure leak—not unknown in ships this old—you flipped the hood over your head, and the suit could keep you alive for two days. If surviving aboard *Container Ship #6* could be considered living.

Bok made his voice go high and plummy, a mocking impression of the announcers in the "All About Art" vid show. "Why, suh, after a hard day's terraforming, knocking down high mountains and filling up low valleys, what we Martian folks want most of all is a little culcha down at the old operah house, doncha know."

Grinning at his own cleverness, Bok flipped a magkey through a lock. Whining, the cargo bay door slipped open, revealing a barnlike room full of hexagonal shipping crates packed so tightly they squeaked against each other when moved. Marshall's hand computer claimed each crate in the first section held fifty flexible rods. It was his job to prove they did, that no light-fingered loaders cheated Trans-Solar of its due income.

With one expert jerk of his right

hand, Bok popped a crate out of its place and snapped open the lock. The crate opened just as Bok's left hand ran a sensor over the contents. The computer beeped, confirming the box did indeed contain fifty flexible rods. Bok slapped the lid closed, then flipped the crate back into place.

The whole thing had taken maybe fifteen seconds.

"Now you try, perfesser."

Marshall grasped one of the crates and gave it a firm yank.

Splotch! His sticky boots unstuck, his body zipped up, and his head struck the ceiling, a paper-thin layer of graphite fiber which boomed like a drumhead.

Bok roared with laughter.

After a struggle, Marshall freed one of the crates and got it opened. Fifty flex rods no thicker than a pencil leaped out, bouncing everywhere and drifting away. Squelching with each step, Marshall ran after them, and Bok squelched just behind him.

"Damned useless lacy panties perfessor," Bok grunted. "I'd hate to have to depend on you in a fight. I hope to hell you're more use to them on Mars than you are to me. Though come to think of it, if Mars really wanted you that badly, they would have paid full fare and let you ride with the other fluff in the passenger ships."

Marshall agreed. The idea of getting a discount on his fare by working had appealed to him, and inventory officer had sounded safely clerical. He hadn't realized he'd just signed up with Captain Bligh.

Marshall plucked handfuls of flex rods out of the air. Weird things, one meter long and made of some sort of fibers trapped in black plastic. Their flexibility was carefully graded from 0 (willowy) to 10 (rigid as steel), and sizes up to the thickness of a man's arm. Special connectors on each end allowed them to be locked together. The Mars colonists mounted entire factories on wheels, with flex rods to soak up the vibration of movement. But of course they didn't have to count them. Marshall had never thought they could be such a pain to work with.

Bok followed Marshall step by step, commenting on his technique, his dexterity, and his ancestry. Not one comment was flattering. By the end of his first eight-hour shift, Marshall had learned more about the obstinate ways of the various sizes of flex rods than he'd ever dreamed of. Not to mention items like powdered wine (you had to check the seal on each bag), microchips (watch for static!), and blasting explosive (Bok advised extreme care; assistants were free, but explosives cost money.)

At lights out, Marshall lay in his bunk staring up at the vague shape of the person sleeping in the bunk above. Bed time had never been more welcome. Normal gravity at last, for the living quarters rotated around the ship's axis like a wagon wheel. Marshall shared a "cabin"—a box with three bunks tiered along one wall and flimsy plastic lockers on the other—with a tiny Hawaiian-Chinese woman named Judy Fong and a Nigerian man whose English name was David Lumba. His true Nigerian name was a deep secret. One more man was named Lewis and worked "night" shift. Marshall rarely saw him, and he spoke to no one. Now both crew mates snored peacefully, David with a sort of grunting, and Judy with a high-pitched whistle.

Marshall had dreamed for years of space travel. Like most childhood dreams, the idea of going into space died along about grad school.

Not that he minded being a historian. The students were bratty, but the research was fun. But when a chance to apply for a job as the first history teacher on Mars came along, the opportunity had seemed too good to miss.

Now he wondered if it would have been wiser to miss it. Partial gravity, no gravity, down is up and up is across—he felt clumsy, stupid and useless. Not to mention ignorant. So what if you could explain the Louisiana Purchase or the Treaty of Utrecht? He was beginning to realize Mars was new ground, frontier country, with little room for frills. Already he felt as useless and out of place as a French pastry maker at the Battle of Shiloh.

Marshall would have resigned and gone back home except you can't stop a space freighter. Like it or not, he was in for the full five year contract.

But maybe he was giving up too easily. This was only his first day. In a few weeks, he'd learn. Bok would lighten up. Things would change.

In a few weeks, things did change. They got worse. Now Marshall learned about rat holes, long tunnels to the six external cargo bays, huge drumlike cylinders a hundred meters long hanging fifty meters from the central core ship. They were unpressurized, so he had to inch through the rat holes wearing a helmet and a pressure suit which snagged on every rough spot in the tunnel. Marshall stewed in his own stink while he wormed his way loose, inched forward, then caught the next snag.

Galley slaves had it better than this.

He was making like a rat, a very miserable, tired, and claustrophobic rat, when Bok yelled over the intercom, ordering him to get the hell out and go to his cabin. On the double.

Or on his belly. It was fifteen minutes before Marshall finally made it back to the cabin.

Both his roommates were glued to the vid when Marshall walked in the room.

"Hi, folks," Marshall said, peeling out of his pressure suit and sticky boots, scratching spots which had been itching all day. Embarrassing in front of Judy, but everybody did it, and a working stiff's privacy was not a high priority on board *Container #6*.

"You'd best put your suit back on," David said, without looking up from the vid screen.

"Are you kidding? That thing's a pressure cooker."

"Watch the news," Judy said, pointing at the wall vid.

The vid showed a space ship. Not a tub like the *Container #6*, which looked like a baseball bat with cargo bays, but a military ship with flaring rocket nozzles, laser cannon, and a hull strong enough to take rapid acceleration.

The announcer said that mutineers had seized the UN cruiser *Arcteron.* A group calling itself the One True Dawn claimed responsibility and presented a long, incoherent ultimatum which the UN had taken under advisement. In the meantime, the ship refused orders from Earth, had turned on its electronic radar countermeasures, and disappeared from surveillance.

"So what's the One True Dawn up to?" Marshall asked. "I thought they just put bombs in airports and the like."

"No one knows," said Judy. "But what they need right now is supplies."

Marshall's blood ran cold. "Us?"

"Exactly. Fuel, air, food and water. Enough for years. No other possibilities."

"Hadn't we better turn back?"

"Figure it," said David, in his careful English. "This ship's not built to be light on its feet. We have ionic propulsion; it takes a month to build up top speed, and a month to stop. They've got a nuclear rocket. It's like a speed boat chasing a supertanker."

"God. So we wind up as prisoners on a renegade warship."

"There's no room for prisoners on a warship. We already have orders to stand by to abandon ship."

Suddenly the vid screen turned red. "Air tight security has been breached," a strong male voice announced. "Full pressure suits mandatory for all crew. All hands to the central living area."

Adrenaline spurted through Marshall's arteries. In one swoop, he leaped down from his bunk and into his pressure suit. Already he could hear the hissing of leaking air. He flipped the hood over his head, set the seal, then turned the suit control to automatic.

Dave and Judy had already left for the central living area. Marshall followed. The central living area contained some couches, exercise equipment, a vidscreen, two readers with boxes of disks and a Virtual Reality game about the California Gold Rush.

"Where is everybody?" said Judy, her voice coming through the suit intercom.

"I don't know," Marshall said. Silent in the near vacuum, the game flashed red and green lights. Marshall turned his intercom to general hail.

"Hello, anyone here? Please answer me." No one did, so he hailed twice more.

Suddenly the door flew open, with Bok right behind it, a laser pistol in his hand. To Marshall's astonishment, Bok slammed him against the wall, grabbed the hailing antenna poking up from his emergency pack, and ripped it loose.

Bok put his helmet tightly against Marshall's. "You moron," he hissed. "Don't you know they can track that signal of yours halfway across the Solar System?"

Too astonished to resist, Marshall stood still while Bok plugged in an optic fiber lead into his intercom socket. Then Bok plugged in Dave and Judy, until all four of them were linked by a wire almost as thin as a spider's web.

"OK," Bok said over the intercom. "No more radio."

"What's happening, sir?" said David, his voice low and tight.

"Nothing good." Bok looked each one of them straight in the eye, then continued. "As best as I know, Lewis is with the goddamned New Dawn. He put a heat bomb through the central control. This ship is dead. We can't maneuver. We're just a big box of goodies sitting helpless in space."

"So where is he now?"

"I chased him out with this," Bok waved a small laser pistol. "So he took the life boat and went over to the *Arcteron*."

"The *Arcteron*? Isn't it—"

"It's right outside, big as life and twice as ugly. There'll be a boarding party over here in about fifteen minutes."

"My god. What do we do?" said Judy.

"First, we get the hell out of the central living quarters which is the first place they'll look. Second, as the spacer's bible says, the crew shall defend the ship with our utmost endeavor."

"Defend the ship? With what?" Marshall said.

"History lessons and pink panties, prof! Now move!" Bok snapped. "And watch you don't break that comm link fiber."

Marshall moved.

In a few minutes, they had plunged through a rat hole and reached an external cargo bay. Marshall looked over the familiar hexagon containers and groaned inwardly. If he had to die, must he do it among flex rods and geologist's supplies?

"You guys stay right here," said Bok, his voice panting with the exertion of crawling through the rat hole. "If I've figured right, the *Arcteron* should be parked right next to us." He pointed vaguely ahead. "They'll be sending shuttles over with soldiers and robos to take their pick of the supplies. Maybe they won't expect us to be here."

He paused. No one said anything.

"So. What I'm planning to do is to sneak up through the bay and open a port. It will be in the shade; they won't see me—I hope. Then I'll see if I can't pick off one or two with this." He waved the pistol.

"So what good will that do?" said Judy. "If they shoot back with their laser cannon, you're dead."

"We're all dead anyway," Bok said. "What I want to do is to slow them down with a little guerrilla warfare. Help's on the way. I've already radioed the cruiser *World Guardian*, which will be here in about twenty hours. The *Arcteron* must get these supplies. If we can just hold them up for one day, we'll whip them."

"One day is a long time for four unarmed people against a warship," said David. "The second you fire, they'll track your energy emission to its source, and fire back. And not with that little flashlight you have, either."

"Look," Bok said. "I'm hoping I can shoot and move fast enough to get out of the way before the tracking computer can pinpoint me. Sure, it's risky. So anyone got any bright ideas, I'm open for suggestions."

No one said anything. With a grunt, Bok plunged into the cargo bay, the optic fiber cable crawling after him like a long silk thread. The three others stood helplessly looking at each other, constrained so tightly by the narrow hallway that none could move unless the other two moved also.

"Jesus, I see them," Bok said at last, his voice coming over the intercom. "The *Arcteron*'s so close I could kiss it. There's already a shuttle landing on our central living quarters. OK, kids. Close your eyes. Get behind something solid. I'm going to shoot."

The three of them hunkered down behind a solid wall of hex containers and closed their eyes.

For a heartbeat, nothing happened. Then suddenly everything turned red, and Bok screamed.

Even with Marshall's eyes closed, the light hurt. When the glare subsided, he opened his eyes and looked around. The solid ranks of hex containers had been scattered as if slapped by a giant's hand. Many had broken open, spilling flex rods everywhere.

Beyond the containers the whole side of the ship gaped open, showing the clear black sky of outer space with the *Arcteron* gleaming in the sunlight and a cloud of flex rods drifting in space.

"Bok?" Marshall said into the intercom. Bok answered with a moan. Marshall leaped up, smacking into the ceiling in the zero gravity. Moving with the economy of an experienced spacer, Judy passed him. With Marshall and David following, she found Bok.

Curled in a fetal position, he floated a meter over the deck, moaning to himself. One foot was missing. Judy ripped open her emergency med kit for a self-applying tourniquet. Marshall watched in fascination as tiny fibers contracted around the stump, cutting off the flow of blood. The automatic sealant in Bok's pressure suit had already closed, holding in the air.

"You shouldn't have bothered," Bok said. "We're all dead anyway." His voice sounded slurred. Pain drugs in the tourniquet were already taking effect.

Judy made comforting noises, but Marshall agreed that Bok had a point. Gingerly he approached the hole torn in the side of the ship. Making sure he stayed in full shadow, he looked out.

In any other circumstances, he would have viewed the scene that met his eyes as beautiful. Perhaps two kilometers away, the *Arcteron* floated in space, its dark hull gleaming in the sun. Three small shuttles, boxy craft with small rocket thrusters, clustered around it, with the larger mass of the *Container #6*'s lifeboat pulled alongside.

The lifeboat was being unloaded, Marshall decided. The shuttles couldn't carry much. The *Arcteron* would have to work fast if they intended to strip the *Container #6* before the *Guardian* arrived.

Marshall glanced down at his own ship and froze. One of the *Arcteron*'s shuttles had already landed on the *Container #6*. Two men in space suits, both armed with heavy laser rifles, were assembling a small machine, placing a large, bowl shaped sensor "head" on a squat body equipped with rocket thrusters.

"My god," Marshall said, his mouth dry with fear. "They've got a robot tracker like the police use. They're going to track us down."

Dave looked outside and whistled. "No hope if that thing locks on to our infra-red pattern. We must run."

"Run where?" Judy said. "Bok's in no condition to go racing through rat holes. We can't drag him. Anyway, how long will it take for them to pinpoint us?"

"Leave me here," Bok said. He pulled himself to a sitting position and picked up a large flex rod. "You run. I'll wait in ambush and try to smash that thing."

"With two men shooting at you?" Judy said.

Fascinated, Marshall watched the tracker. Now the "head" started rotating, its delicate sensors tuned to detect heat, light, electromagnetism. Spurting tiny flames from its maneuvering thrusters, it started in his direction, moving very slowly. The two soldiers clung to its back, their laser rifles at the ready.

They're expecting an ambush, Marshall thought, or they wouldn't come on so slowly. Bok doesn't have a ghost of a chance. Neither do any of us.

"Now I know how a caged rat feels," he said.

"Those sensors in that thing are very delicate," said David. "If only we had some sort of weapon. A good kick on the side of the head would knock it out. Maybe I could sneak out in the shadow, and—"

"Forget it," Judy snapped. "Those goons would fry you long before you got close enough to kick."

What they needed was a weapon. Marshall looked around the cargo bin. Hex boxes and flex rods were strewn everywhere. He picked up one of the rods. Maybe it would work as a spear, except there was no point. Anyway, he could never throw with the speed and accuracy he needed to do any real damage. He remembered taking a course in primitive weapons. He'd never managed to score above mediocre in the javelin throw, but he'd been excellent in . . .

Of course! Quickly, he grabbed two thick rods and locked them end to end, making a rod two meters long. From the doughnut on the back of his suit, he cut a length of anchoring cord slightly longer than the rod, stringing it like a bow.

"Run, idiot." Bok said. "What are you doing?"

"Look, this worked great at Agincourt," Marshall said, nocking a slender but very rigid number 10 flex rod into his makeshift longbow. Experimentally, he pulled back the arrow. Crude. But flex rods were carefully made. Probably it pulled smoother than anything available in wood at the Battle of Hastings.

Marshall stepped to the open space, careful not to let himself out of the shadow. In the same motion, using all four fingers on the cord, he pulled the bow back, aimed at the tracker's head, and released the arrow.

The cord slapped the sleeve of his pressure suit, but the flex rod arrow flashed straight into the tracker's head, knocking bits of broken glass everywhere, then rebounding and shooting off into space.

Instantly the tracker's forward thrusters fired, shooting it backwards, scurrying to cover like a frightened cockroach.

Marshall stepped back. Only then did he notice Judy staring at him, her eyes big with surprise. "You hit that tracker with a flex rod. I can't believe it."

"Yeah." Marshall picked up another flex rod arrow. "But they'll be back. I don't think I did any permanent damage. These things don't have any real power; they bounce off. Maybe if I could make a sharp point, I might be able to penetrate a pressure suit and really give them a problem."

"I have a better idea," Judy said. "Bok, where are the geologist's supplies located?"

In seconds, Judy and David had their instructions and were gone, moving at a speed which Marshall could never have matched. Now he was alone, except for Bok, who lay behind some crates, his flex rod club in his hand.

A powerful searchlight lit up the side of the ship, hitting the gaping hole at a slant.

What next? Marshall thought, stepping back into the shadows. The light paused for a second, then swept on. Reflected in its powerful beam were hundreds of flex rods, scorched crates, and other junk bleeding from the ruptured hull and making a vast cloud in space. Good, thought Marshall. All that junk will show up on radar. Tracking an arrow through it should give their computer fits.

He crept to the edge of the floor and peeked out.

His heart stopped. The searchlight came from the tracker.

"Bok, they must have had a spare head. They're coming again."

"Hang on until Judy gets back," Bok said.

The tracker came creeping nearer by the second, with the two goons on board flipping the light everywhere.

What I should do is abandon Bok and get the hell out of here pronto, Marshall thought. What is he to me, anyway? Maybe I could crawl into a container some place and hide until help comes. Let the damned *Arcteron* have its supplies. I never signed up to be a soldier, anyway.

But he didn't run. Without even understanding why he wouldn't, he nocked another arrow and waited for the searchlight to turn away.

"Marshall!" Judy and Dave came leaping into the room. Both carried hex crates marked "Caution: Explosives!"

"Here, take some instant holes. They'll give those rods you're shooting some real punch." Judy popped open the crate, and picked out a bit of bright orange plastic the size of a man's thumb.

"Instant holes?" Marshall said.

"Sure. Geologists use them to set anchors in rock, or prepare for blasting. A small shaped charge. Knocks a hole five centimeters through the toughest rock." Judy placed one on the end of an arrow and handed it to Marshall. "Careful. It's fused to explode on contact."

Marshall nocked the arrow, then, seeing that the searchlight had turned away, popped out like a rabbit from its hole.

He gasped. The tracker stood only ten meters away, coming up fast. In his excitement, he released the bow too quickly. The arrow shot past the tracker, struck the wall of the cargo bay behind it, then exploded with a flare of light.

Instantly, the tracker spun around, the two goons firing wildly at the place where the arrow had exploded. From behind, Marshall could see the tracker's lox tank, a bright green sphere.

More carefully this time, he took another instant-hole arrow and shot it directly into the tank. A bright flash, then the tracker flipped up, then whirled end over end, smashing itself and its luckless riders into the solid wall of the external cargo bay.

"Well done, soldier." Dave's hand dropped on his shoulder. "A masterful stroke of distracting the enemy with a clever ruse."

Actually, the bad shot had worked out beautifully. The tracker doubtless was programmed to keep its vulnerable rear away from the enemy. It had sensed the explosion, not the arrow. Obviously, whoever programmed it hadn't thought of an archer's attack.

"Marshall," Bok said. His voice was weak. "Shoot at the *Arcteron*. If you can penetrate the pressure hull, it will distract them. Better. Get a fuel tank. Liquid hydrogen under tons of pressure. It's hell if the tank ruptures."

Marshall looked at the *Arcteron*. Two kilometers, way out of range. But hell. He was thinking like a dirt heel Earther. Without wind, without gravity, the arrows would fly straight. He'd never thought about it before, but outer space was perfect for archery.

"Show me," Dave said. He held out a flex rod bow and arrow he'd made. Marshall gave him and Judy a one minute lesson in the basics of archery, then all three stood just behind the edge of the hole in the ship's side and shot arrows through the junk-filled sky at the *Arcteron*.

Soon Marshall's arms felt like they were going to fall off. He was shooting all over the sky now, with no control. Most of the arrows must have gone wild. But soon little pinpricks of light flashed on the *Arcteron*'s dark hull.

Take that, you bastards, Marshall thought, resting on his bow. He stepped to the open, and glanced out. In the distance, he could see a shuttle pulling away from his ship. "They're leaving us," he said. "I wonder what's happening?"

Fifty meters away, the hull of the *Container #6* turned cherry red, then flared into a cloud of blinding white.

"They're shooting at us!" Marshall shouted. The floor under him twanged like a plucked bow string.

"Good," Bok said. "Let them waste energy."

"Yeah. Well, they're going to burn us out of the sky wasting energy," said Marshall. A thought occurred to him. "No. They won't burn up the ship.

They're simply cutting this cargo bay loose from the rest of the ship. Then we'll be trapped."

"Marshall, I think we're already trapped," Judy said. She bent down and looked. "The rat hole is red hot and breaking up. We can't get out of here."

"And here comes the lion for his prey," David said. He pointed outside. Marshall looked out and saw the *Container #6*'s lifeboat, festooned with armed soldiers, approaching fast.

"Run for it!" he shouted. Even Bok pulled himself along with his hands, and the four of them raced to the back of the cargo bay. Sprinkles of red light glowed on the walls, eating holes the size of a man's head. One of the boxes of explosives burst in a flash of white light. A flex rod thick as his arm shot by Marshall's head and buried itself halfway in the wall in front of him.

Marshall sucked in a long breath. Another two centimeters to the left, and that thing would have gone through his head. His knees went all wobbly. Only the lack of gravity and his sticky boots kept him standing.

"It's gone," David said. The hot spots glowing on the walls cast a dim reddish light throughout the room. In a motion that was half between walking and swimming, Marshall and Judy followed David to the hole in the wall.

Outside, the lifeboat's thrusters flared as it raced away towards the *Arcteron*.

"It's using its front thrusters," Marshall said. "Why? Is it stopping?"

"I think perhaps it is turning to come around again," David said. "Maybe they have puzzled out our flex rods fly very slowly. If the small ship attacks very fast, it will be safe."

"We won't be safe," Marshall said. He looked around. The cargo bay had been riddled with holes, and the thin walls twisted in the heat from the laser fire. Long cracks worked their way from hole to hole, threatening to split the walls open. Without air, the heat had nowhere to go except into the walls, and the flimsy structure couldn't take much more stress. Yet if they tried to escape to the other part of the ship, they would have to cross empty space, easy targets for lasers.

Judy must have been thinking the same thing, for Marshall could hear her whispering "Please, please, a miracle."

Hot, brassy acid stung Marshall's throat. He could taste his fear and disappointment. After such a fight against such impossible odds, they deserved better than to die now.

Then the miracle happened.

A spark of flame flared on the lifeboat's main external lox tank. A geyser jetted out into a massive white cloud, the reaction kicking the lifeboat forward. The thrusters failed from the sudden lack of oxygen, and, in one long, strangely graceful movement, the lifeboat closed the distance to the *Arcteron* and smashed into the warship's side. No sound came to him, but Marshall could see the metal buckle, the *Arcteron* rolling with the blow, great gouts of fuel spurting out, then vanishing into the emptiness of space.

"What happened?" David said.

"An arrow," Marshall said. "It's been plodding on its way all this time. The lifeboat passed it up, then slowed down in front of it."

"How could you have possibly known that when you shot the arrow?" Judy said.

"I didn't. It was an accident. Or a miracle, or something."

A lurid red light glared from the *Arcteron.*

"Fire on the spacecraft!" Bok shouted happily. Unnoticed, he had come up behind them. "Nothing worse than loose fuel in your ship's atmosphere."

The glare went out.

"Ah. They've depressurized the ship," Bok said. "Otherwise, they'd burn to a cinder. Now I wonder how much Oh-two those bastards have left?"

A long thumb of flame bloomed from the *Arcteron*'s main engine. For a second, the ship trembled, then moved forward, faster and faster, then it was only a long streak of fire in the distant black sky.

"Hell, perfessor," Bok shouted, smacking Marshall on the back. "You're letting them get away!" He roared with laughter at his own joke, waving his bloody stump as if such a slight wound were nothing.

Marshall felt the floor flexing under him. A long crack sliced across, widening until he could have put his hand through it. Carefully, he stepped back.

"The good ship *Container #6* seems a bit overdue for maintenance," he said.

Then all of them were roaring with laughter, standing in a circle, hugging each other, patting their pressure suits as if to make sure they were still there, still alive.

"Wine!" Bok shouted. He pointed down to the crack at their feet. "There's tons of wine powder and water down there. We have about enough time to tie on a good one before the *Guardian* gets here."

"You mean steal it?" Judy said.

"No, liberate it. We saved it, didn't we?" Bok said. "Or at least the perfessor here did. God. Here we are facing billions of dollars of high-tech laser cannons, sensors, computers, trackers, god knows what all, and a perfesser comes up with the perfect weapon for outer space. No flash, totally emission free, cheap as vacuum. A flex rod launcher! How the devil did you ever come up with that idea?"

"Well," Marshall said. "Actually, the idea isn't entirely original with me." ■

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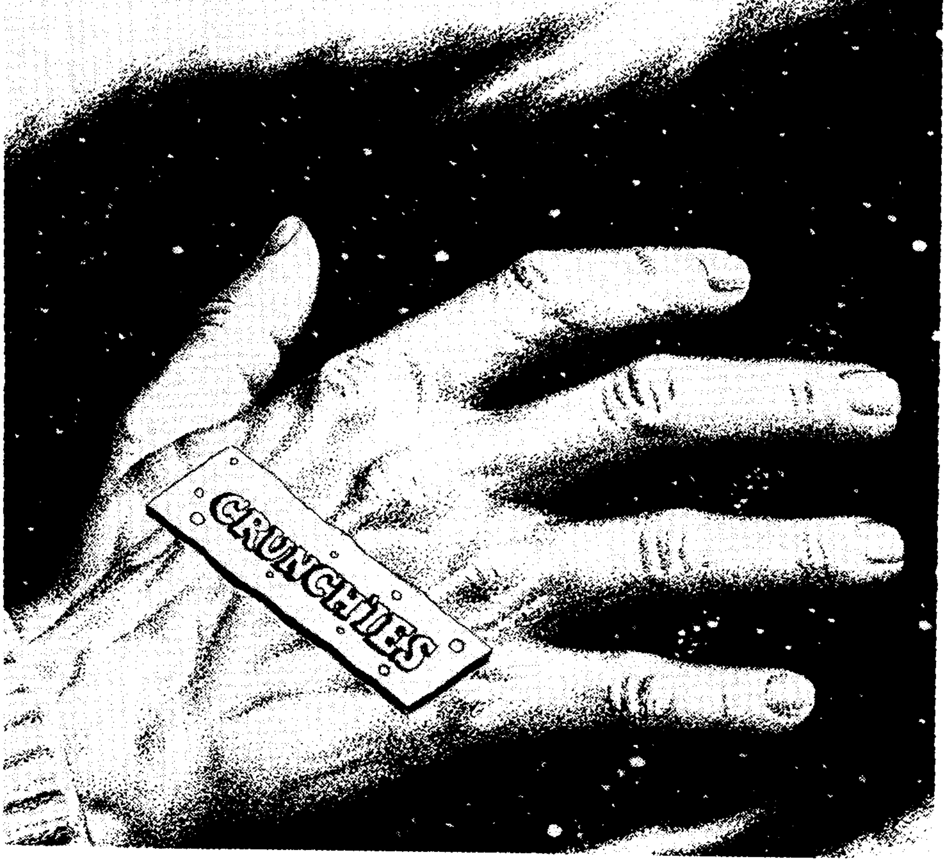
J.T. Sharrah

THE ACQUISITORS

Naturally, any advanced scientific student takes pains to avoid disturbing his subjects. . . .

Illustration by Bob Walters



Curiosity.

Wayne Tucker had an abundance of it. Curiosity was the rowel pressed against his flank, the fret gnawing at his subconscious. The relentless curiosity that burned within him was both a curse and a blessing. He was eternally impaled on the hook of a gigantic question-mark; his inquisitive streak beating its wings against the unknown like a butterfly seeking escape from a net, but it was this same quirk of mind that made him such an exceptional cop. Tucker was the Glendale police department's resident Elephant's Child. If something failed to make sense, Tucker would remain nose-down and baying on the scent until he had sorted it out. That was his reward. That was his objective. Tucker wasn't so much an instrument of justice as a probe into the inexplicable. He was not motivated by a desire to see the guilty punished. That was a secondary consideration—a side effect. Tucker's main preoccupation was unscrewing the inscrutable. He was not at peace unless he understood what was going on.

One hundred and forty-six bicycles?

The memorandum reached his desk Monday morning. Weekend traffic on the switchboard had included 146 calls reporting stolen bicycles.... Tucker was wearing the abstracted frown that meant he was thinking hard. Strange. Bicycles were, of course, tempting targets for minor-league thieves. There was nothing unusual about the disappearance of a bicycle. But 146 of them? Within a period of two days? Tucker's curiosity was aroused. He volunteered to conduct the investigation.

Harold Connell, chief of police, arched a dubious eyebrow. "If I recollect correctly," he said, "the list of unsolved crimes on our books at present includes two murders, one kidnapping, four armed robberies, one rape, one case of arson, and one hit-and-run. And what is it that you want to do? Trace missing bicycles? Are you sure you have your priorities straight?"

Tucker shrugged. "Glendale isn't exactly a major metropolis."

"Don't let the Chamber of Commerce hear you say that. Your penance for such blasphemy could be severe. Who knows? They might force you to eat a whole bowl of Crunchies."

"Compulsory suicide? Even the Chamber of Commerce wouldn't go that far."

The company that manufactured Crunchies Breakfast Food was headquartered in Glendale. Its presence was one of the community's few claims to fame. The only genuine celebrity that Glendale had ever produced was the iconoclastic poet, Skipper Higgins, but Higgins was not remembered with pride or affection. His *Ode to the Old Home Town* had the unique distinction of containing within the framework of a single poem seventy-six words that rhymed with "hick."

"The point I wish to make," said Tucker, "is that 146 bicycle thefts would not be cause for comment in Los Angeles, but Glendale is not Los Angeles. By Glendale standards, all of this is—to put it mildly—peculiar."

"I grant you that." Connell waved a hand like some distinguished prelate dispensing absolution. "It just seems to me that we have more pressing business on the agenda."

"Maybe. Then again, maybe not. It doesn't *feel* right to me. Call it a hunch."

Connell regarded Tucker with a expression of weary resignation. Tucker's hunches frequently hit pay dirt. The man seemed attuned to a special wavelength of his own. His antennae were constantly questing, triangulating on sources of illicit activity. Over the years, he had acquired a reputation for uncanny instincts.

"All right." Connell's tone of voice betrayed his reluctance. "I'll give you five days. Understand? No more. If you haven't uncovered any leads at the end of that time, you'll drop the matter and concentrate on CRIME." The upper-case letters were clearly audible. Murder was writ large in Connell's book. The theft of a bicycle was not. "Agreed?"

Tucker nodded. "Agreed. And thanks for indulging me."

"Forget it."

"Forget what?"

Connell expelled a long breath that might have been a sigh of exasperation. "Don't be a smart-ass. Be a smart cop instead." He motioned a hand in dismissal. "Now get out of my sight."

"Right. I'm gone."

Wednesday afternoon.

The elevator disgorged Tucker into a long hallway so lavishly carpeted that walking down it seemed like an act of desecration. He found the office he was seeking at the far end.

He closed the door behind him, conjured a winning smile, and approached the receptionist's desk. The creature seated behind it apparently belonged to the female gender, but at first glance she could have been mistaken for an NFL linebacker. A full-grown hippopotamus would have seemed more petite and feminine. Her hair had been dyed a shocking shade of purple. She was reading a confession magazine that promised to reveal dark and perverse secrets in bold print on the cover. Tucker took the chair opposite her. She did not look up. He cleared his throat. There was no response.

Tucker sat and listened to the subdued whisper of the air-conditioning. He solved mathematical equations in his head. He counted the holes in the ceiling tiles. He took his pulse. He stared at the floor and contemplated his shoelaces. Finally, he leaned across the desk and said, "I'm not keeping you awake, am I?"

She turned the page and continued with her article.

"You're alive!" Tucker pointed a finger of accusation at her. "Don't bother to deny it. I saw you move!"

Her disregard was Olympian.

Tucker raised his voice. "You wouldn't be hard of hearing?"

She did not reply.

Tucker subjected his fingernails to careful scrutiny. Five minutes passed. The silence was so intense that he could almost hear them passing. He was beginning to wonder if he had suddenly become both invisible and inaudible when a small, balding man emerged from a door marked MEN and crossed the room to a private office. A wooden voice devoid of inflection said, "You may go in now."

It was as if a statue had stepped down from its pedestal and walked away. Tucker was taken completely by surprise. "Did you say something?" he asked, cringing at the inanity of the question even as the words left his mouth.

A pair of flint-hard eyes appeared above the magazine and regarded him with contempt. "Knock before you go in," she snapped.

Tucker repressed an astonishing impulse to make an obscene gesture and deliberately opened the door without knocking. The room beyond was so savagely air-conditioned that it could have doubled as a frozen food locker. There was an aging cherub behind the desk who stood up and introduced himself as Hiram Morton. He had the condescending air of a man imparting information any fool would know. Tucker grasped the outstretched lump of putty masquerading as a hand and took the indicated seat. Morton made a big production of lighting a cigar. Between gusty inhalations, he said, "Now, what can I do for you?" His manner was blandly indifferent. What he could do for Tucker was obviously foremost among the least of his concerns.

Tucker allowed some of his annoyance to show. "Look, is this a place of business or an asylum for apathetics?"

Morton could not have been more offended if Tucker had accused him of using a silver chalice as a chamberpot. "This is, I assure you, a business office," he said primly, "and now that you're here, I'd be grateful if you would state your business."

Tucker displayed his badge. "I am Lieutenant Tucker of the Glendale police. I called for an appointment."

"You did?"

"I did."

"Must have slipped my mind." Morton spoke as if such lapses of memory were standard procedure. In Morton's case, Tucker decided, it probably was.

"For the past two days," Tucker explained, "I have been interviewing robbery victims. At the outset, I was concentrating on bicycle thefts, but that was just the tip of the iceberg. My inquiries revealed that an astonishing number of objects have turned up missing recently. Bicycles, musical instruments, portable tape decks—all sorts of things. And I mean exactly that. *All sorts.* Refrigerators, for example. Home appliances of that size don't usually attract thieves. They are cumbersome. They are difficult to remove from the premises, difficult to transport. Disposing of them afterwards is equally difficult. Too much trouble for too little profit. Ordinary thieves wouldn't bother. But these thieves aren't ordinary. They'll take *anything.* Profit doesn't seem to figure in their thinking. They've made away with doors, windows, mail drops, plastic lunch boxes, kitchen cabinets, mirrors, coffee mugs, doghouses, fence posts, telephone directories, wastebaskets—the list is endless."

"And apparently pointless," Morton observed.

"Yes. Apparently. Unless they're planning to stock a junkyard, I can't imagine what they have to gain by it."

Morton drew on his cigar, allowed a dragon plume of smoke to idle from his lips. "No rhyme or reason to it?"

Tucker responded with a vacillation of his hand that meant both yes and no. "No reason—at least that I have been able to discern, but I may have discovered hints of a rhyme."

"I assume you mean something that links all of these incidents together."

"Yes. Exactly." Tucker delved in his pocket, removed an object, and placed it on the desk for Morton's inspection. "You recognize it, of course."

It was a self-affixing decal. The word "CRUNCHIES" appeared in luminescent letters against an abstract background. As part of the company's latest promotional campaign, decals of identical design were being offered as prizes inside boxes of Crunchies cereal.

"The thefts have several common denominators," Tucker said. "Each of them occurred at night. No one in the household heard or saw anything. There were no signs of forced entry. Only one or two items were taken. In many instances, worthless objects were stolen from rooms containing objects of genuine value. And—" he held a finger aloft for emphasis—"all of the missing articles were decorated with one of your decals." He gave Morton a glance of inquiry. "As the president of Crunchies, Inc., would you care to comment?"

* * *

Thursday—2:45 A.M.

Jake Milligan's eyes were rimmed with fatigue. His hair was in disarray. His clothing was rumpled. He looked like an unmade bed which, in point of fact, was where he had been when the telephone roused him.

"Sleep," he muttered as he unlocked the door to the crime lab. "Innocent sleep, sleep that knits the ravell'd sleeve of care, sore labour's bath, balm of hurt minds. Methought I heard a voice cry 'Sleep no more!' Tucker does murder sleep."

"Call it justifiable homicide," Tucker said. "Can you say the same? I'm tempted to arrest you for the murder of one of Macbeth's better speeches."

"How can you expect me to get it right at this ungodly hour?"

"What has the hour got to do with it? You used to improvise your lines all the time."

Tucker and Milligan were old friends. Both had participated in their high school's drama program. On one occasion, Tucker had played Banquo to Milligan's Macbeth.

"That's right," Milligan grumbled. "Haul me out of the sack in the dead of night and then add insult to injury."

"I'm sorry, Jake." Tucker's tone of commiseration was sincere. "I wouldn't have disturbed you if it weren't important."

"I wouldn't have come if it had been anyone else but you."

"Guilty as charged. I'm taking shameless advantage of our friendship. I realize that."

"What's the rush? Why couldn't

this wait a couple of hours?"

"I'm running out of time. Connell gave me a five-day deadline. He'll pull me off the case unless I have something positive to show him PDQ."

Milligan's hand went to the wall switch. Bright light brutalized the interior of the laboratory. Chrome and glass gleamed beneath the flourescents.

"OK. Let's have it."

Tucker dropped the decal into Milligan's upended palm. Milligan looked at it with a sour expression. "This? This is what you want analyzed?"

"Yes. Please."

Milligan mimed mock astonishment. "What was *that* word again? 'Please'? I didn't know it was part of your vocabulary."

"Careful. You're dripping sarcasm all over your workbench."

An hour and a half later, Milligan was studying a graphic on a computer screen and wearing a mystified expression. "You say you got this from a box of cereal?"

"That's right."

"And this guy you interviewed . . . what's-his-name?"

"Morton. Hiram Morton."

"This Morton couldn't shed any light?"

"Him?" Tucker made a rueful mouth. "Morton couldn't shed any light if he were on fire. The man is a monument to incompetence. He has no idea who suggested using decorative decals as prizes. He has no idea where the decals were printed. He has no ideas—period. A check of the company records revealed nothing except that their accounting procedures are as inefficient as their president. You would expect to find a job order on file authorizing production of the decals by a sub-contractor. There isn't. You would expect the printing costs to appear on an accounts payable ledger. They don't. To hear Morton talk, you'd think that the decals were conjured out of thin air by a sorceror."

Milligan's fingers were playing an invisible piano on the tabletop. "Possibly there's no record of a printing contract because no printer was involved in the process. This thing wasn't *printed*—at least not in the usual sense of the term."

Tucker's frown was both an admission of incomprehension and an appeal for clarification.

"Watch," said Milligan unnecessarily. Tucker was watching. Milligan pressed a button. The complicated diagram on the screen dissolved and was replaced by a sequence of dots. "Forget about the artwork. It's just an abstract pattern that conceals the presence of something else. This, to be exact."

"I see." Tucker bent over the display for a closer look. "Then again, maybe I don't. What is 'this'?"

"A code of some kind. I can't read it, but it could be a numerical sequence."

"Yes?" Tucker's tone encouraged him to continue.

Milligan shrugged. "There isn't much more to tell. The dots have been magnetically impressed. It's possible that they're intended to be read by a machine. I can't assign actual values to them, but we can estimate the magnitude. Do you see the pattern? Large to small. Long to short. At a guess, I'd say it was a regular sequence that proceeds from general to specific, but I can't be sure. I'm just speculating."

"Chemical composition?"

"Of the decal itself? I don't know." Milligan picked up the decal and held it to the light. "Looks like a translucent material—or it will be when the backing's been removed. We can try spectroscopic analysis, if you think it's important."

Tucker made a gesture of helplessness. "Jake, I don't know what to think. At this point, I'm willing to try anything. If you were to suggest casting the runes, I'd go along with you."

"All right. I'll set up the equipment." Milligan waved a hand vaguely in the direction of the opposite wall. "See that cabinet over there?"

"Yes."

"Third drawer on the right. You'll find some panes of glass inside. Strip the backing off the decal and stick it onto a glass slide. Handle it like a photographic negative. Edges only. A spectrograph of your grimy thumbprint won't be greatly helpful."

Tucker obeyed Milligan's instructions. Milligan was fiddling with a complicated array of apparatus, hooking cables into power outlets, aligning cameras and testing to make sure that the data readout would be received by his computer console. When he was satisfied, he motioned to Tucker. "OK. I think we're ready. Bring it here."

Tucker started to comply, stopped short and blinked. He spat out a very impolite word.

"What's wrong?" Milligan's voice betrayed alarm. Tucker rarely used profanity. On the rare occasions that he did, it was all the more startling.

Tucker pointed to a table. Milligan looked in the indicated direction. He turned back to Tucker with a glance of puzzlement. "I don't see anything."

"That's just it. There's nothing to see. But there was. The pane of glass. I left it sitting there—on that table."

"It's not there now," said Milligan, stating the obvious.

"No. It isn't, is it?"

"But what . . . I mean, where can it have gone?"

"That's a very good question, Jake. I don't know the answer to it." Tucker spoke with grim determination. "But I will."

Thursday morning.

Dawn was breaking when Tucker pulled into the parking lot adjacent to his apartment complex. His mind was clouded with the sense of disorientation that comes from loss of sleep. As a policeman, Tucker was accustomed to keeping irregular hours. A cold shower and a hot breakfast would, he knew, restore much of his vitality, but his mental sluggishness could not be remedied so easily. What he really needed was eight hours of uninterrupted slumber. Tucker made a wry face. Eight hours. Sure. He'd be lucky if he got two. He was due in the office at seven o'clock.

As he passed through the entrance foyer, he remembered to check the contents of his mailbox. It was bulging with the deliveries for the past several days. Junk mail, for the most part. There was a flyer announcing a sale at a nearby department store, a renewal notice for a magazine subscription, an offer from a mail-order house, a statement from his bank summarizing the status of his checking account, a give-away newspaper consisting almost exclusively of advertisements, a booklet of coupons granting him discounts at neighborhood shops, a bill from the telephone company, and a solicitation from a mortician promising eternal rest if he invested in a cemetary plot prior to April first. The last item struck him as a good deal. Eternal rest. Imagine that. At the moment, he would have settled for considerably less. How about eight hours of rest? Could the mortician arrange for that?

He fumbled for the key that would open the security door, and dropped several envelopes in the process. As he knelt to retrieve them, his eyes lit on the bank statement. And stayed there. The envelope had fallen so that the address-label was upside-down. The top line specified city, state, and zip code. This was followed in reverse order by his street address, his apartment number, and his name. . . . Tucker remained frozen in a half-crouch, his gaze fixed upon the inverted label like a burning glass. Soft thrills of surmise rippled through his mind. Could it really be that simple? A regular sequence. Long to short. General to specific. It was, of course, a wild speculation. Absurd. It couldn't be.

But it was. Tucker's thoughts solidified into a hard core of conviction. He didn't have a shred of evidence to support such a conclusion, but he was sure of it just the same. Call it a hunch. The officers who worked with Tucker had learned to trust his hunches. So had Tucker. This one *felt* right to him.

But how to prove it?

Saturday morning.

Tucker was seated in his favorite armchair. He was doing nothing at all. He was very adept at it. Years of surveillance duty and stake-out details had taught him monolithic patience. It was as if someone had pressed his "off" button. He was slouched bonelessly against the backrest, the muscles of his body so slack that he resembled a deflated balloon. He had made his mind a blank. Any thoughts that intruded were random and directionless. Under the circumstances, his deliberate lack of activity made sense. He had done everything there was to do. All relevant decisions had been made. Nothing further was required of him except perserverance. Tucker had plenty of that.

By any standards, his intentions were reckless. He knew it and didn't particularly care. The insatiable curiosity that was his goad and his gift would never let him rest until the riddle was solved. He had examined the problem from every angle, had considered his options. He had been prowling around the perimeter of a circle, trying to catch a glimpse of the secret in the center. It was no good. The circle would never yield its secret to such a timid inquisitor. He would have to imitate Alexander. This Gordian knot could only be unraveled by a bold stroke. The interior of the circle could not be studied at a distance. It would remain an unknown unless he went inside for a close-up view. To Tucker, an unknown was intolerable. It was an indigestible lump at the core of his awareness, an irritant that must be banished. He had made up his mind to go inside.

A series of elfin chimes from the clock on the mantel announced 4:00 A.M. If Tucker's assumptions were correct, his vigil would end in another fifteen minutes.

Twenty-four hours earlier, Tucker had been seated in the same position in the same chair. He had been conducting a little experiment. The surface of the coffee table had been cleared with the exception of two objects: a chipped flowerpot and a plastic ashtray. Decals obtained from boxes of Crunchies were attached to both. At precisely 4:15, the flowerpot and the ashtray had vanished. There was nothing gradual about the process, no interval of transition. It was as if a magician had waved a wand and willed them out of existence. Presto. Now you see it, now you don't.

Ten minutes past four. Tucker raised his left arm, made certain that the decal was still firmly anchored to the back of his hand. It was. He folded his arms across his chest and relapsed into immobility.

Five minutes later, he was gone.

TO: Cylocin System—Planet Kydak
—Swih Confederacy
Continent of Naposh—City of Tekhoa
Cultural Museum of Kydak
112 Armaat Circle #5
Director Melek

Dear Sir:

My team is currently engaged on a project in the Mellurian Sector. You will find our progress reports on file in the archives. You may recall approving implementation of our proposal, but I realize that our expedition is only one of hundreds sponsored by the museum and that we cannot expect you to be familiar with the details. Perhaps a brief summary of our objectives and methods would be useful.

Decipherment of the radio transmissions from source 112945.8G was accomplished by Cryptographer Jethri twenty-six daks ago. The inhabitants of 112945.8G call their planet Earth (pronounced "Urth"). A study of their broadcast advertising—and especially their methods for promoting sales of a certain variety of food substance—led to a proposal for obtaining artifacts from this primitive society without disrupting the normal development of the indigenous culture. Their own marketing system was used to distribute pre-addressed postal labels. One of our agents infiltrated a facility where packaging takes place and substituted our labels for the trinkets that were being inserted into each package by crude machinery. To the best of our knowledge, he escaped without detection. Once his mission was accomplished, no additional planetfalls were required. The natives mistook our labels for decorative ornaments and affixed them to a wide variety of household objects. We made sure that the postal authority's automated materializers were programmed for collection during dark-phase when most of the native population had retired for the night. To date, the plan has worked splendidly. Thousands of artifacts have been delivered to the mailroom of the museum's local annex.

We have, however, encountered a problem.

Attached you will find a copy of a formal protest issued by the postal authority. The terms of our contract with them do not permit the conveyance of living specimens via the mails. The possibility that one of the natives would attach a label to himself was, of course, unforeseen. Our legal department has concluded that we are in clear violation of the postal code. Their advice is to plead no contest and pay the fine. In the meantime, I have instructed our chemists to modify the formula for the fixative on the back of our labels so that they will not adhere to living tissue. There should be no repetition of this unfortunate incident. There remains only one difficulty. What am I to do with the specimen who appeared so unexpectedly inside the matter-conversion chamber of our mailroom? I am reluctant to consign him to a zoo. He is, after all, a member of an intelligent—if backward—species. On the other claw, he has no legal status in our society and is totally unfamiliar with our customs, technology, etc. As I'm sure you appreciate, the situation confronting us is without precedent. I would welcome any thoughts you may have on the subject.

Respectfully yours,
SUBDIRECTOR AKKOB

Wayne Tucker, Special Consultant to the Cultural Museum of Kydak, sat at ease in the overstuffed armchair that his hosts had constructed to this specifications. His job did not impose much of a burden on him. His principal duty was to explain the purpose and function of the artifacts that the museum was obtaining from Earth. Answering questions instead of asking them went against the grain of his basic personality, but the polarity of the situation would be reversed as soon as he acquired fluency in the alien language. He did not anticipate a prolonged wait. His command of the spoken word was improving daily, and once he had mastered the hieroglyphs in which the alien tongue was written, the museum's vast library would be at his disposal. The curiosity that had always bedeviled him would be given a playground of unlimited scope in which to frolic. For the first time in his life, Tucker was content.

As Tucker was well aware, the aliens regarded him as an oddity. He was a square peg in a round hole—a rational being who did not conform to the conventional definition of a rational being. He was more than a pet and less than a citizen. It was an unorthodox compromise, but they treated him well and he did not lack for company. Visitors to his quarters were frequent. Tucker suspected that some of them were zoologists. If so, they were exquisitely polite zoologists who refrained from any reference to their profession. The primitive creature in their midst seemed to be a source of endless fascination to them.

The man with the bottomless curiosity had become a curiosity himself, and that too was a role that Tucker found curious. ■

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THE ALTERNATE VIEW G. Harry Stine

LIFE AFTER HEATHKITS

Did anyone else besides me suddenly realize that we've come to the end of a technological era?

There are no more Heathkits!

For the first time in 45 years, the Heath Company won't produce a new annual catalog of do-it-yourself electronic assembly kits. In fact, they won't produce any more kits, period.

How well I remember discovering a Heathkit catalog in 1949! As I eagerly thumbed through it, I discovered that for very little money, I, too, could have my own oscilloscope, VTVM, signal generator, and other electronic marvels. I could buy it as a kit and assemble it myself. All I had to do was to find the money, fill out the order form, and send it to Benton Harbor, Michigan, with check or money order.

Mind you, this was well before the time that Diner's Club introduced the credit card. American Express decided to offer competition by using its escrowed traveler's check funds to launch its own credit card. Then the banks got into the act with MasterCard and Visa when they saw how lucrative the credit card business was. But before the credit card, we were in a cash economy or, at best, we could get a net 30-day charge account at the local store if the owner knew you well enough. "Money" has changed, hasn't it?

I still have my Heath oscilloscope, and it works. True, it goes only to 30 megaHertz and doesn't have all the modern-day bells and whistles. But *I built it and it still works!* And I'm secure in the knowledge that I can probably fix it if something goes wrong because I have the original assembly and trouble-shooting manual. But I've never had to fix it.

I also have my 1954 Heathkit miniature multimeter. I use it in preference to my Radio Shack Micronta DVM when I want to get something more than a number. Like, for example, when I want to see a trend in the rise or fall of voltage by the way the needle behaves. I didn't build the Radio Shack digital unit that couldn't be purchased for any price in 1954. I bought it ready-to-use for less than I paid in real dollars for the Heathkit.

But, wow, Heathkits were wonderful! I learned a lot from building them.

It was always a great day when the postman delivered the big box from Benton Harbor, Michigan. I'd open it and find gobs and gobs of parts in little paper sacks (no plastic baggies then, either). Nuts. Bolts. Washers. Terminals. Wire. Sockets. Transformers. Chokes. Pots. Capacitors. Resistors. Vacuum tubes. (Remember them?) And one or more aluminum boxes all punched and drilled and ready for mounting the parts or putting the whole assembly into when finished.

And a fantastic, fully illustrated assembly book that introduced the world to the step-by-step method of assembly. I mean, the instructions were like "invert boot, pour out water."

The Heathkit instruction books were so good that I deliberately copied the style when I started the first model rocket company, Model Missiles, Inc., in Denver in 1957. The first model rocket kit assembly instruction sheet wasn't. It was a staple-bound booklet with step-by-step instructions and a check-off box next to each step. It worked. Thank you, Heathkit!

And thank you, Heathkit, for introducing me to the wonderful world of proper assembly of technical gadgetry. And how to trouble-shoot a gadget if, for some reason, it didn't work right or failed to pass the smoke test. I learned how to wrestle technology to the ground and make it do what I wanted when it didn't want to.

Another nice thing about Heathkits was that I *knew* what was inside each one I built. I knew what function each part performed. And I knew what to look for when the assembly went toes-up. I learned how to fix electronic equipment.

I also learned I should possess the service and maintenance manual for every piece of technical gear I owned. I managed to get the full book on my Piper Cherokee. That was tough because no one except aircraft mechanics were supposed to care about it. And I have the book on every one of my cars (including some I've sold and forgotten to send the manual along with them). I have the full technical manual for the computer with which I'm writing this. How many people bother? (I may not be able to repair my computer, but I don't fall for the line, "You're going to need a whole new mother board.")

Heathkits helped teach me to be a technologist. I can't give Heath Company the full credit because I had some good teachers out in the real world, too.

But the world has changed. Electronic technology has changed.

What we used to hand-assemble in a Heathkit is now *grown* in a Singapore factory and never is intended to be messed with by the user. When it quits, it's supposed to be thrown away and replaced with a new part. If you can't find the part, the whole gadget goes in the trash. Today's generation of electronic engineers, technicians, and repair people does things differently. I wrote an AV column about this called "Getting Something Fixed" (Mid-December 1989).

A.H. (After Heathkits), you don't get anything fixed; you get it replaced. And the replacement is smaller, more efficient, and performs better.

Case in point: I was one of the early "high fidelity" buffs. Forty years ago, it was extremely expensive to buy a good music amplifier. If you were young, just starting out, and wanted one, you had to build it yourself. So I made a Williamson amplifier. In 1954 this was surpassed by the UTC Linear Standard amplifier. So I made two of those for stereo. I had the first stereo rig at White Sands. The only stereo records I could buy were produced by my friend Emory Cook.

I mounted it all in a steel electronics rack 6 feet high that weighed more than 200 pounds. Those power and output transformers had a *lot* of iron in them! The rig also helped heat the house in the wintertime (and the summertime, too).

I kept that vacuum-tube monster until mid-1992, and I never changed a tube in it. Of course, when the schematic said to use a half-watt resistor, I used a one-watt gold-band. I used oil-filled capacitors. I used DC for the vacuum tube filaments. In short, I built a Wonderful One Hoss Shay. It was playing as well when I got rid of it as it did when I built it 38 years before. I gave it to a friend who owns a company that makes stereo boom blasters for cars. He wanted it as a museum piece for his lobby.

I replaced it with a $150 solid-state unit that I can easily hold in my hand, that sounds better, and that uses less than one-tenth the wattage. Yes, I got the manual for the new unit. But I'll never be able to repair it because it's full of obscure integrated circuit chips from Malaysia.

The Heathkit era is over, folks. And so is the computer kit universe where Steven Jobs and Stephen Wozniak got Apple started.

Well, we can only shrug and forge ahead, knowing that technology is progressing and that nothing is forever.

But what about life after Heathkits?

It's a different world.

It's the modern version of the transistor radio world.

Most of you don't remember what it was like when the first transistor radios became available in about 1958. It was a terrible shock to learn they couldn't be fixed. If one quit, you threw it away and bought a new one because (a) the cost of fixing it was greater than the cost of a new one, and (b) they couldn't be fixed anyway because germanium transistors were such touchy things.

It's trending that way with autos, too. Today, professional auto repair people and shade-tree mechanics do more component replacement than component fixing. If you blow the engine, it's cheaper to buy a new car. (Except in the American Southwest where cars don't rust and Checker Auto stores are as ubiquitous as cowboy bars.)

This sounds terribly wasteful to someone who grew up in the days of the old Yankee handyman whose motto was (and still is), "Anything can be fixed." Today's millennium mechanic operates on the basis of "Anything can be replaced if you can find the part cheap. If you can't, it's more economical to junk the gadget."

To the old timer, you have to be terribly rich to do this.

Well, folks, that's the world we're moving into. The late Herman Kahn of the Hudson Institute think tank had it nailed down pretty well when he gave his general forecast of the future:

"A hundred years ago, the human race everywhere was few, poor, and generally at the mercy of the forces of nature. A hundred years hence, barring some incredible combination of bad luck and poor management, people everywhere will be many, rich, and largely in control of the forces of nature."

We're all *rich?* Sure! Think of the things we throw away today that our parents would have had fixed. Like toasters.

Most towns and cities today are surrounded by a beltway of junk yards. I'm a junk yard junkie, so I know. That's the final resting place for our technical gadgets that quit working. We're so terribly rich and getting so much richer that we're becoming used to throwing something away when it quits.

I suspect our primitive ancestors might have felt the same way about a broken arrow.

And that's what the legendary Heathkit has become: the broken arrow of electronics.

Life without Heathkits is going to be different because Heathkits and what they taught my generation are no longer meaningful. Truthful, yes, but not meaningful to the millennium life style. Although we must still know and understand technology (the sort of lessons Heathkits taught us), we don't have to spend as much time in detailed design and assembly of the gadget based on the technology. We can now afford to spend more time thinking about how to use it properly and wisely. Remember: We spend more time and money on technology for fun than we do for war. See "Technology and Fun," the AV column in the Mid-December 1991 issue.

Life without Heathkits is going to involve learning how to be rich and in control of the forces of nature. (We don't have to learn how to become many; that can be achieved with relatively unskilled labor. Learning how to live together as many is another matter, and that takes skill indeed.)

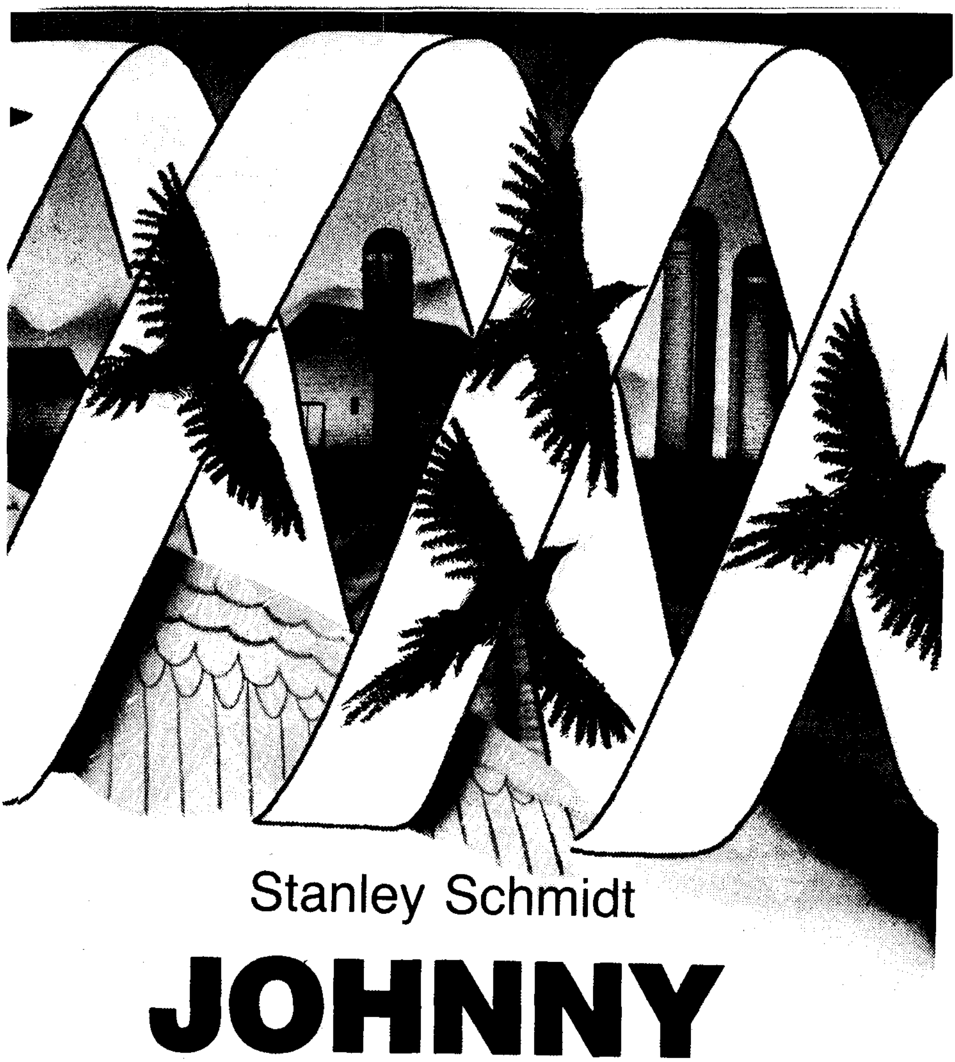
Becoming many, rich, and in control of the forces of nature are the biggest problems facing the human race today.

And don't say this isn't taking place because it is.

I have an old Heathkit catalog that proves it. ■

"Kettle at eleven o'clock!"

The familiar cry rang out from a single deep voice through the crisp late September air. Twenty-three pairs of binoculars and four spotting scopes on tripods swung in unison to just west of north. Dozens of eyes strained to find and identify the distant swarm of migrating hawks. Shirley Ching aimed her 7×35's along with the rest, but failed to find the birds. Some of these people had been doing this for decades, but she still wondered how many of their less-than-obvious sightings were real.



Stanley Schmidt

JOHNNY BIRDSEED

"You can't go home again" applies to more than houses and neighborhoods. . . .

Illustration by Broeck Steadman

She looked around at her motley companions. Sometimes watching the birders was more fun than watching the birds. They weren't all from her own club, but they had a lot in common: the plaid jackets and jeans, the Peterson field guides, and above all the optics aimed at a common point somewhere up the Hudson. *They're polarized*, Shirley thought, suppressing a chuckle. *Like iron filings drawn to a magnet. . . .*

"They're getting closer," somebody said. "But I still can't tell. . . ."

"What *are* those things?" That was Joe Parker, which surprised Shirley, because Joe never asked. He always *knew*, usually before anybody else. *If only*, she'd often thought, *he'd put as much energy into protecting them as he does into identifying them.*

That thought threatened to sidetrack her onto the one thing that still made her feel a bit like an outsider among the best group of friends she'd yet found. But the others seemed to be getting *awfully* interested in this mystery spot in the sky. She lifted her binoculars back to her eyes, and this time she found them, a distinct cluster of birds flying this way with more unanimity of direction than she'd seen in the few hawk kettles she'd managed to find. "They're high up, that's for sure," she remarked.

"Sure are," said somebody else. "Hey, they're turning this way!"

The whole mass had turned like an exhibition team of jet fighters and seemed to be flying straight for the herd of birders on Hook Mountain. They got close enough to make somebody blurt out, "Those aren't hawks!" and then they swerved again, to the east.

Shirley couldn't follow them with binoculars that close. She let the glasses fall to her chest and watched with unaided eyes as the birds mobbed the decoy owl someone had set up on a post. They certainly weren't hawks; they weren't anything she'd ever seen before. Yet they did look hauntingly familiar. . . .

Two people to her left, one of them Joe Parker, were peering at their field guide and frowning. "It's not in here," Joe said.

"No . . . yes! Here it is!" said the one Shirley didn't know, pointing excitedly at the picture and then at the real birds, just as they abandoned their attack on the decoy and shot off to the west.

To her surprise, Shirley made the connection even before Joe did, but she couldn't bring herself to say it loud enough for anyone to hear her. "They can't be!" she breathed. "They've been extinct for more than eighty years!"

Watching Clarissa Murray always filled her nurse, Bubba Edwards, with a wistful sort of sadness. She was so tiny, so pale, so wrinkled. Only her thinning white hair and her clear blue eyes still seemed to have any luster or life in them. Her eyes were startling in their clarity, but he could never tell what they were looking at. It seemed to be something very far away.

She never talked, unless you asked her a simple yes-no question. "Do you want carrots tonight, Mrs. Murray?

Would you rather have the peas?" Those she would answer, and she never gave anybody any trouble. He wished he could say as much for a good many other residents. But Clarissa never smiled, and she had slept through her own hundredth birthday party. That bothered Bubba. Despite knowing so little of her beyond what was in her file, he liked her. He had an unshakable, if unfounded, conviction that the husk he saw was a vestige of someone who deserved a better end than this.

Sometimes, when Bubba could find a few minutes to spare, he would park his black bulk next to the frail little wisp of Clarissa and talk quietly to her, trying to make some sort of contact beyond peas and carrots. He'd been doing it for a quarter of an hour now, talking to her about the way the trees were starting to turn. As usual, he saw no clear sign that she even heard him. She just sat by the window, ancient brown shawl drawn around her shoulders for warmth, staring vacantly at the birds on the lawn and around the feeders Mr. Samuels kept filled as his one remaining hobby.

Ah, well. At least she seemed to draw some very quiet pleasure from that, and Bubba had other residents to look in on. Giving up the quest for today, he stood up, patted her gently on the shoulder and drawled, "Well, you have a nice day, Mrs. Murray. I'll see you later."

He started off down the hall, but an astonishing, raspy shriek behind him froze him in midstride. *"Daddy! There's one out there now! Go get it, quick!"*

Bubba spun around, keeping it slow to avoid scaring Clarissa. It didn't matter; she wouldn't have noticed him anyway. She was partway out of her chair, supporting herself on her arms and pressing her face against the window, staring intently at something outside.

Bubba walked over and laid a hand lightly on her shoulder. He tried to see what had so excited her, but all he saw was the yard and the pigeons and sparrows. "What is it, Mrs. Murray?" he asked quietly. She gave no sign of hearing him. "Clarissa?"

She turned her face toward his. "You said I could have another one," she said. "There's one now. I want to hold it!"

Bubba frowned. "One what, dear? I'll get it for you if I can."

"P-passenger pigeon." Her pronunciation sounded oddly childish. She pointed insistently at the birds, and after a moment Bubba realized that she was pointing at one particular bird that stood apart from the others.

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It was walking toward them, picking at spilled seeds.

Her words meant nothing to him, though they did sound vaguely familiar. But they were more words than she had said in a long, long time. And now that he thought about it, that bird did look a little peculiar. . . .

The Sun had just dropped behind the Catskills and Gerhard van Schemmingen ("Schemmy," to friends and family) was making his way back to his tractor when he saw the flock swoop down on his just-planted field. It was a good-sized flock, maybe a couple of hundred pigeons. Not enough to be a serious threat to most of his fields, but annoyingly bigger than the usual flocks that wandered over from the cliffs in the foothills.

And this wasn't most of his fields. This was the experimental plot. He'd been paid good money to try out new varieties of winter wheat. The field was smaller than most, and every row individually more important. A loss he could shrug off in production acreage could cost him his contract here.

He watched the birds scratching and pecking at the fresh, moist, fragrant earth for half a minute, vaguely troubled by the idea that there was something not quite right about what he was seeing. Then he trotted over to the tractor and whipped out the 12-gauge he carried in a scabbard behind the seat. He almost never used it, and when he did, it was usually just to scare off pests. If ever there was a time for that . . .

He loaded the shotgun and trotted briskly back to the edge of the field. Then he stopped and cocked the gun. "Git, y'ugly varmints!" he bellowed as he flicked off the safety. The gun recoiled hard against his shoulder and its full-throated report rolled around the valley. Most of the birds looked up as birdshot whizzed past above them, then went back to their feeding. Schemmy ran forward a few more steps, as menacingly as he could. "Can't you take a hint?" He fired again.

This time they must have decided to leave at the very instant he squeezed the trigger. Suddenly they were all airborne, a writhing, thundering cloud that wheeled and sped with astonishing rapidity toward the hills.

Except one, that rose ten feet and then dropped like a rock, a detached feather fluttering lazily down after it. Normally Schemmy would have just let it lie—varmints made good fertilizer, and nobody cared about city pigeons—but the whispering sensation that something was odd lingered. This time he clicked the safety back on and walked up to look at the bird he had hit.

"Oh, no," he breathed when he got there. His first impression had been that they were a completely unprotected species; he hadn't meant to hit any, but didn't much care if he did. Seeing it up close, it seemed he couldn't have been more wrong. It was *never* legal to shoot these, and Schemmy tried hard to be law-abiding as both farmer and hunter.

But the longer he looked, the more doubtful he became. This sure wasn't what he'd first taken it for, but it wasn't what he thought it was on his first close look, either.

It wasn't anything he'd ever seen before.

He stood there for a couple of minutes, turning the fallen bird over with his foot to look at it from all sides. He didn't want to get in trouble, but . . .

He'd better ask Raul about this, and hope he understood.

Deputy sheriffs didn't get their own offices, but since state budget cuts had led to Raul Rivera's doubling as game warden, he rated his own little cubbyhole in the annex behind the county office building. He stared for a long time at the bird Schemmy had laid out on his desk, on top of the newspaper it had been wrapped in when he brought it in. Then he looked up at the farmer, a wiry and well-worn blond who looked older than his forty years.

"Well?" Schemmy prompted.

"Well," Raul said slowly, "I know exactly what it looks like. It looks like a passenger pigeon."

"Passenger pigeon?" Schemmy frowned. "Never heard of it."

"The last one died in 1914," said Raul. "In the Cincinnati Zoo. Or so the books say." He stared at the bird on his desk, which was starting to smell. He kept looking for some way to convince himself it wasn't, but every detail, from the blue-gray head to the slaty back to the long, pointed tail, and back to the rosy-pink breast, looked *exactly* right for a passenger pigeon and clearly wrong for anything else. "Are you putting me on, Schemmy? Did you swipe this from a museum somewhere, or your Grandpap's collection, and bring it in here to play mind games with me?" Even as he said it, he knew it wasn't that at all. This was quite obviously no preserved specimen from a musty old collection. It was exactly what Schemmy said it was: a real bird that had been alive only hours earlier.

"You know I wouldn't do that," said Schemmy. "And you know I wouldn't shoot a mourning dove on purpose. I thought they were regular pigeons, and they were raiding a field I'd just planted with special seed I can't afford to lose. I just wanted to scare them off. But this one somehow flew right into my pattern. It was an accident." He hesitated, then ventured a mischievous grin featuring one gold canine. "But you should have seen the ones that got away!"

"Don't worry about that," said Raul. "It's not a mourning dove." He looked at it once more and frowned. "Excuse me a minute." He turned to a crowded bookshelf behind him and pulled out a couple of volumes. He blew the dust off each in turn, then consulted its index and took a long look at certain pages. Then he put the books back on the shelf and turned back to Raul. "It's a passenger pigeon," he said with finality. "So the mourning dove ban doesn't apply. What's bothering me is, what *does* apply? You say there were a couple of hundred of these in your field?"

"Yep."

Raul took his word for it. He'd known Schemmy for years, and he was a good observer and a careful hunter. If he said there were a couple of hundred passenger pigeons in his wheat field, there were.

And that was *very* odd.

"I'm going to overlook this," he told Schemmy "because of the peculiar circumstances. But don't shoot any more, OK? Put up a scarecrow, or something. I'm going to have to look into this. I've never had anybody shoot an extinct animal before, and I'm not sure what the legal situation is. But I'm going to have to find out."

"Sure, Raul, I understand." But the look on Schemmy's face made it clear that he didn't, really. He started to wrap the bird back up, but Raul reached out to stop him.

"Why don't you leave that one here?" said Raul. "And let me know everything you can about any more you see—but don't say anything to anybody else. OK?"

Schemmy looked at him peculiarly for several seconds. Then he said, "Sure thing, Raul. See you around. And thanks." Then he turned to go, without his bird.

Raul did a lot of thinking after Schemmy was gone. What *was* the legal status of somebody who shot an "extinct" animal? Was it completely outside the law, since it officially didn't exist? Or might there still be some ancient law on the books that nobody *then* had bothered to repeal, but nobody *now* could be expected to know?

And where were they coming from? He just didn't see how after all these decades of *never* being seen, so many of them could suddenly show up on Schemmy's farm. Could they somehow be coming back?

For a moment Raul let himself think wistfully of the incredible flocks he'd read about that had roamed North America not much more than a century ago. Wouldn't it be great if they *could* come back?

Or . . . would it? He thought about it a little more, and frowned deeply.

On the whole, maybe his life would be simplest if this weird thing on Schemmy's farm was just a fluke.

But it wasn't. Two days later he got a phone call from a very polite fellow named Bubba Edwards, with a deep voice and a southern drawl, who said he was a nurse at a local nursing home. "This may strike you as a little odd," the phone voice said apologetically, "but I have to know something. Is it legal to catch a passenger pigeon?"

Raul felt a twinge of anxiety. "Maybe you'd better explain that."

"Oh, I know they're supposed to be extinct," said Bubba, "but . . . it's kind of a long story. Got a minute?"

Raul sighed. "Sure."

"Well, sir, I've got a patient here, a real sweet little old lady named Clarissa Murphy. You may have seen her picture in the paper. She's a hundred years old. Real sad, too. In all the time I've worked here, she's hardly said a word. Just sits by the window and stares out at the birds. Then, the other day, all of a sudden she jumped out of her chair, all excited, and started talking to me about one of the birds out there. She called it a passenger pigeon—but then, she thought I was her Daddy, too.

"Well, I didn't know what she was talking about, but that bird did look a little odd. I was so tickled to hear Clarissa talking about anything I figured I'd just go ahead and let her think I was her Daddy for a while and see what she had to say.

"It seems when she was a real little girl, she found a passenger pigeon with a broken wing and her Daddy let her keep it and take care of it. He told her there used to be zillions of them but there were hardly any left so hers was real special. That made a powerful impression on her. She nursed the bird back to health, and then one day a cat got it. Clarissa was heartbroken. Her Daddy told her if she ever found another one, maybe she could keep that, too. She's remembered that for almost a hundred years, Mr. Rivera, and now suddenly there's one hanging around on our lawn here at the home. I know it is one, because we've got a bunch of old books here for the residents. I found a picture in one that looks just like it.

"I think it's an honest-to-God miracle, Mr. Rivera, and you wouldn't believe what it's done for that old lady. She keeps saying she wants to hold it 'cause her Daddy said she could, and I think it'd do wonders for her if she could. So I just wanted to know: would it be OK if I caught it and kept it for a little while? I don't want to hurt it or anything. . . ."

Raul listened intently and then sat pondering so long that Bubba prompted, "Mr. Rivera?"

Raul started. "Yes, Mr. Edwards. I'm here. That sounds like a real nice thing you want to do, but the law isn't exactly clear on passenger pigeons. As you say, they're supposed to be extinct—"

"You don't believe me, do you?" The voice was more hurt than angry.

"As a matter of fact, I think I do, but I'm just getting used to the idea. Tell you what, Mr. Edwards. Let me give you some advice on how you might catch one and take care of it. Then if you can do it, you can at least let your patient hold it once. But if you do, be sure to let me see it, too. OK? Then maybe I can get you an answer about keeping it."

He didn't really expect anything, of course, but . . .

He spent most of Saturday in the library.

Three days later Raul came back from a shift of patrolling back roads and breaking up domestic fights to find a young lady camped on his doorstep. Tall, gangling, with swarthy skin and curly black hair, wearing faded jeans and a red plaid flannel shirt and big round glasses, she reminded Raul of a skinny owl. She exuded nervous energy even before she opened her mouth. "Hi, Mr. Rivera? My name is Shirley Ching and I've been waiting two hours to see you—"

"I'm flattered," he said with a wry smile as he collapsed into his swivel chair, "but why bother? There are plenty of other deputies."

She smiled back, rather engagingly. "But they're not all game wardens, and wildlife is what I'm here about. Very special wildlife. Would you believe passenger pigeons?"

He sighed wearily. "I'm afraid I would."

She frowned briefly. "That's hardly the reaction I expected." Then her animation came back. "Maybe you think I'm just a college kid on a sorority prank or something, but I'm not. I'm a very serious woman, Mr. Rivera, and something terribly exciting has come up. I'm a member of the Valley Bird Club . . ."

Raul sat back and soaked up her words as she told him how she'd been watching the annual hawk migration with members of her club and several others on Hook Mountain, down in Rockland County. A couple of dozen pigeons, she claimed, had come in high and fast and buzzed their site. "We got a *really* good look," she concluded, "and there are some *really* good observers in that bunch. We were all reluctant to claim it, but in the end we had no choice.

"Well, I just had to find out if anybody else had seen them too. So I've been calling around to other clubs and Audubon chapters. Nobody's saying anything officially—they're certainly not putting it in their newsletters!—but I found a lot of good people who, off the record, thought they did.

"So then I started on the fish and game people, and that's why I'm here. I don't want to take too much of your time, but I'd really like to know if you've had any sighting reports. Because if the passenger pigeons are really coming back it's terribly exciting and we have to be sure they're protected!"

"Or something," Raul muttered. Ms. Ching frowned, apparently startled, but Raul was too busy with his own frown to care. "Yes, I've heard a few reports, and I think it's high time we put a bunch of heads together."

Without explaining, he started dialing the phone.

It took eleven calls to get them all together, but Raul hoped it would be worth it. His office was too small, so he arranged to borrow a small conference room in the county office building—on a Sunday that should have been his day off.

He surveyed the diverse faces gathered around the worn old oak table and mused that they were a good lesson in the risks of judging people from their names or phone voices. Shirley Ching certainly didn't look or sound Chinese. He had pictured Bubba Edwards as a refined redneck, while in fact he was ebony black and looked more like a linebacker than a nurse, though his supervisor at Smiling Willows said he was a very good one.

And Schemmy, of course, was Schemmy.

Raul could see that they were all a little uneasy because of his uniform and badge, but he was used to that. He slid into the one empty chair at the table and leaned slightly toward them, smiling and speaking softly to defuse the tension. "Hi," he said, "I'm Raul, and I want to thank you all for coming. I know it wasn't convenient for any of you, but you can be a big help to the Department of Environmental Conservation.

"I think you know why I asked you

here. You've all seen passenger pigeons—a bird that used to be very common, but supposedly was hunted to extinction almost a century ago. We at the DEC are very interested in finding out why people are suddenly seeing them again, and you've all shown an interest in that, too. So I'm hoping we can all help each other. Bubba, have you had any luck with catching yours?"

Bubba shook his head sadly. "No, sir. Haven't even seen it lately. But I'm still watching, and I'm ready to try again if it comes back."

"Well, I wish you luck. This patient of yours who remembers seeing one when she was little. Did she grow up in Michigan, by any chance?"

Bubba looked startled. "Why, yes. On a farm near Gr—"

"Grayling?" Raul finished with him. "I'm not surprised. I've been reading up on passenger pigeons. They didn't go extinct overnight, of course. They declined gradually over two or three decades. But the last big nestings I found records of were right in that area, just before the turn of the century. They were probably still too early for your Mrs. Murray to remember. She must have found a straggler, one of the last wild survivors. Her father must have been quite a man, in that day and age, to impress on her the significance of that."

He noticed Shirley nodding approvingly and turned to her. "How about you, Shirley? Done any more research?"

She smiled. "Uh-huh. I've kept calling clubs farther and farther from here. The same thing I told you before: nobody wants to go on record, but off the record, a lot of people have seen them. I started checking dates, too. They seem to have started up north and spread vaguely south. It sounds like a migration, but not very well organized."

Raul nodded. "Good work. I've been doing something similar, except I've been calling fish and game offices. What I've heard follows the same general pattern." He looked at his old agricultural friend. "Any more troubles on the farm, Schemmy?"

Schemmy looked almost apologetic that he didn't have any more to offer. "No, it's been nice and quiet. I guess mine have moved on. Want me to take the scarecrow down and see what happens?"

"Maybe later," said Raul. "I think we've established that these critters are back, in goodly numbers. So there are several things we need to find out. Just how big are those numbers? Where are they coming from? Can it be that they were really extinct and have somehow reappeared? Or did they just get so scarce that the few survivors retreated into deep wilderness and nobody saw them for ninety years?"

"Obviously," said Shirley Ching, "they were never really gone. Extinct is forever. If they'd really all been gone, nobody could see any now. And *lots* of people are seeing them."

"Yes," Raul said. "Too many people, too fast."

Shirley frowned. "What do you mean?"

"During one of our phone chats, you remarked that the reports you were getting were like what happened when mountain lions started reappearing in the east. People saw them for years before anybody got willing to talk about it in print. Well, pigeons are a lot easier to see than mountain lions. If there had been enough around during all those decades to produce this fall's flocks, somebody would have noticed them from time to time. I think they really *were* gone, and now they're coming back fast. I think somebody's *bringing* them back."

They all started talking at once and he waved them to silence. "These days," Raul said, "extinct is *not* necessarily forever. Sometimes I think it might be better if folks kept thinking it was, so they'd be more careful with what they've got before they lose it. But the fact is that genetic engineering has made things possible that our parents would never have dreamed of. Any of you folks ever read a book called *Jurassic Park*, by Michael Crichton?"

They looked at each other with silent shrugs. Then Shirley said, "I did. But that was just science fiction."

"Based pretty carefully on real science," said Raul. "For Bubba and Schemmy, let me just say it's a novel about some folks who get dinosaur DNA from fossils and start raising real dinosaurs—who get a bit out of hand. You might want to read it; it's kind of a fun story, in a gruesome sort of way."

Both Bubba and Schemmy were staring at Raul with unconcealed skepticism. Bubba said, "But you don't believe anybody could really do that."

"Sure do," Raul said cheerfully. "I read it in college and asked one of my biology professors about that. He said of course it's fiction, but the basic principles are sound—and it would be a lot easier to do with passenger pigeons than with dinosaurs. You can get specimens which are practically fresh, by comparison. Pigeons are smaller, adapted to modern conditions, and we know more about how to take care of them. Grind up some bones to get DNA, use standard gene sequencers to touch it up here and there, and pretty soon you're ready to start growing pigeon embryos. From there on, it's plain old poultry husbandry. Schemmy could do it. Hell, even I could do it!

"That's what I think has been happening. Somebody has swiped some passenger pigeon parts and used them to clone real birds, raised them until he had viable flocks, and then turned them loose in remote sites in the north woods where they could breed all summer. Now we're starting to see them because they're migrating into more populous regions down here.

"What I want to know is, who did all this—and why?"

"Obviously," said Shirley with a nervous giggle, "Johnny Birdseed." Then her expression turned odd, almost stern. "Does it really matter who did it? Or do you just want to know because cops and game wardens are trained to ask that about everything? Seems to me that the important thing is just to be grateful that they're back, and make sure they're protected."

"No," Raul snapped, not hiding his irritation at her question, "it's not that simple."

"In the first place," Raul said, "I'm interested in *why* because even though I sketched the process in a few words, it's far from simple or cheap—even for something as recently extinct as passenger pigeons. Whoever did this has gone to a great deal of trouble and expense, some of which may well be illegal. In the second place, it may put a lot of people, places, and things in danger."

Shirley burst out laughing. "Oh, come on! You've got to be kidding!"

Raul looked at her sharply. "Remember *Jurassic Park*?"

"Sure. But those were dinosaurs. Anybody can see that turning a tyrannosaurus loose in the modern world would cause trouble. But we're not talking about dinosaurs. We're talking about pigeons." She held up both hands, palms facing inward about a foot apart, and shrugged.

"And you think because they're small and cute they're automatically harmless? Ask an African farmer if he thinks locusts are harmless because they're small. You say you're a birder, Ms. Ching, and I know you've done some reading. But did you really grasp what the passengers were like in their prime? Let me remind you . . ." He swept his gaze over all three of them and added, "All of you. Observers all over this continent reported flocks that literally blackened the sky for hours or even days on end, that broke down the trees in the woods where they nested with the sheer weight of their numbers, that ate everything edible in their path. They were so numerous that hunters collected them with no thought for the possibility that they could ever make a dent in the flocks. And then, after a while, it was too late."

"Humans destroyed them," Shirley half whispered. "We had no right to do that. It was genocide, pure and simple. Bringing them back is just a way to make amends."

"But is that what it would do? I agree with you that our ancestors did irresponsible and tragic things. But you can't undo them by bringing back one piece of the fabric that was lost. You may think you're restoring a lost ecosystem, but what you really do is disturb a new one. And I have to ask whether the new one can stand this disturbance."

"You mean," Bubba asked, "you think the passenger pigeons might be dangerous if they come back?"

"No doubt in my mind," Schemmy declared emphatically. "The only ones I've seen were playing havoc with the most profitable acre I own. That was a few dozen birds. You think I want millions of them?"

Raul nodded. "Please, try to picture it. The dark sky, the steady hum of wings, the devastation of forests and farms. . . ."

Shirley was scowling. "You don't know that it would turn out like that."

"No," said Raul, "but we don't know that it wouldn't, either. And we need to." He softened his voice deliberately. "I think I know what you're thinking, Shirley. I'm not saying I want to go out and slaughter them all again. Part of me would love to see them back, too. But if we allow that, we have to make sure we don't let them become a plague we can't handle. And if your 'Johnny Birdseed' had a real reason for this, we need to know what it is. Can *you* think of a reason, beyond an incredibly expensive prank?"

"I already told you my reason," said Shirley, a bit defiantly.

"But is that enough to make you do all this person has done? I'll grant that for some folks it might be. But what I'm saying is that maybe, just maybe, he figured out a reason why we *need* the passenger pigeons back. If that's true, we need to know, too, so we can help." He paused. "You see what I'm saying? You see why we need to find out who did it, and why, and how much?"

Shirley looked at him for several seconds before she said quietly, "Yes, I do." He had a nagging suspicion that the reasons she saw were still not the ones he saw. He'd really hoped she would be an ally, perhaps even his most valuable. Now he found it all too easy to imagine her working against him. She added, "Tell me one thing. Are they protected now?"

"There's some doubt about that," he told her. "Which is another reason to learn as much about them as we can. If there *is* a good reason to protect them, you'll want to help get that protection in force as soon as possible, won't you?"

He thought he saw her mouth the words, *Of course there's a reason!* Then she said aloud, "Yes. I certainly will."

"Good." Again Raul addressed all of them. "So I think you all see what we need to do, and why I'm counting on your help. Any ideas on where we might start looking?"

He was a little surprised, and tentatively pleased, that Shirley spoke first. "Well, if somebody's been cloning them, somebody must have been able to get hold of genetic material and then work with it. Getting it has to come first. So we need to find out who had specimens of passenger pigeons, and ask them if any have been stolen or tampered with."

Raul favored her with a sincere smile. "Very good. Unfortunately, the places most likely to have specimens are museums, and they're not on the police nets."

"How's that?" Bubba asked.

"Police departments these days, including sheriff's offices, have computers that are hooked into nets with law enforcement offices all over the country. I pull you over for speeding in New York, I can find out in half a minute if you're wanted for something in California. But those nets don't tell you what you might find in a particular museum—and you can't judge by what you saw if you've been there. I've been behind the scenes at some museums, and what the public sees is just the tip of the iceberg. Any good one has rows and rows of drawers and cabinets full of study specimens.

"So—Shirley's idea is a good place to start, but not an easy one. Contacting all those museums will be laborious and time-consuming, and so far I don't have a clear enough idea of what we're looking for to justify using much county time or money on it. So I'll be working largely on my own, at least at the start. Any help you can give me would be *most* appreciated."

For several seconds no one spoke. Then Shirley said, "I'll help. And I'll bet my club will help, too."

Raul looked at her, increasingly puzzled by what was going on behind her eyes. Did she really want to help—or did she want to be in a good position to obstruct what she feared he wanted to do? He sensed the mutual distrust, and had no doubt that she did, too. But he'd have to take a chance on her. Maybe she and her club *would* come back with a lead—and if they didn't, he could follow up independently on places they'd claimed to check. "Excellent," he smiled. "Bubba?"

"I wish I could," said Bubba. "But the home keeps me real busy. It was hard enough just getting away to come here today."

"And you know what farming's like," said Schemmy.

Raul nodded. "I understand. Well, please let me know if anything falls into your laps. I hope you catch one for the old lady, Bubba." He turned back to Shirley. "Well, looks like it's just you and me on the phone. Shouldn't be too hard, actually. All you need to do is find out whether they've found any tampering. Don't try to do a full investigation. Just let me know right away if anybody says yes, and I'll follow it up."

* * *

The next week dragged. Raul hit the phone every chance he got, and for all he knew the whole Valley Bird Club did the same—except that all but the closest museums were long distance calls, so he knew some of the members were writing letters instead of calling. Raul did none of that, but his phone campaign, even using the office phone, felt increasingly like fishing on a day when they weren't biting (though sometimes they laughed). By the eighth day, he was beginning to wonder how much more time he could justify spending on the search. There hadn't been any more pigeon sightings for a while.

And then Shirley called, her excitement bubbling right out of the phone. "I've got a hit, Raul, a very palpable hit!"

"Hm-m-m?" It took a while to register. "You mean you've found a museum with pigeons missing?"

"Uh-huh. It's a little private museum on the edge of the Catskills: the Riley Creek Historical Society." As she told him where it was, he ran his finger over a map. Not quite in his jurisdiction, but close enough for a visit. "It's mostly old diaries and horse collars and such," she went on, "but they figure the wildlife was part of the history so they have stuffed animals and pressed leaves, too."

"Sounds pretty progressive for a little museum," Raul observed. "Great work, Shirley. Thanks a heap!"

"Glad I could help," she said. "So what happens now?"

"I'll have to follow it up. I'll go over there and have a look, and chat with the people in charge. This could have nothing to do with the live birds, but we won't know until we find out who got into their specimens, and how, and why."

"How can I help?"

"You already have. I'm very grateful for that, but I can take it from here."

The phone was silent for several seconds. "You mean, after I did all that leg work for you and found you a lead, I don't get to be in on the finish? You're just tossing me aside?" She paused again. "This is *really* important to me, Raul."

"I understand that, and I'm sorry. But this just became a genuine criminal matter—vandalism, theft, illegal genetic engineering. I'm simply not allowed to get civilians involved in official investigations like that, much as I might like to. It can get dangerous. You might be willing to run the risk, but the county isn't."

Another long silence. "I understand."

"Look, Shirley, I'm really sorry. There is one thing you can still do: more of what you've been doing. The lead we have could be a false one—or there could be more than one."

"Well . . . OK. I'll see what I can do. But it won't be the same."

The museum was a bit bigger than Raul expected from Shirley's description It filled a big old two-story frame house set back among flaming maples, with peeling yellow paint on the outside but surprisingly modern and well-maintained inside. The "people in charge" meant Director Pauline Snodgrass, a rotund but lively lady whom Raul guessed to be in her late sixties. Her hair, predominantly steel-gray, still showed reddish highlights; her eyes sparkled blue behind rimless glasses. "I can't imagine whatever possessed you to send your young lady asking people such a question," she said as she ushered him into her fluorescent-lit office. "But we checked, and sure enough, somebody had been into the archives. May I ask what made you suspect we'd find that?"

She settled comfortably into the old swivel chair behind the gray steel desk, but Raul remained standing. "Well, I'm not at liberty to tell you much just now," he said, "though maybe after the investigation is complete. . . . Let's just say we stumbled onto rather strong evidence that somebody had been collecting things that didn't belong to him, and some of them might have been yours. Perhaps I could see any that you have left, and the place where they were stored?"

She eyed him briefly through slightly narrowed eyes, as if to let him know that she *could* imagine why he suspected, but chose not to press the question now. Then she said, "Certainly, Mr. Rivera. Follow me." She put her hands on the edge of her desk to help herself up, then led him upstairs.

A locked door labeled NO ADMITTANCE opened into a single large room crammed with tight rows of tall cabinets, with stuffed raccoons and antique lamps and other oddities scattered here and there out in the open. Some of the cabinets were wooden and looked old. Others, of steel and glass, suggested that the museum, small as it was, still received healthy infusions of funding. Interspersed among them were tables at which half a dozen people worked intently with things like microscopes and tiny paintbrushes. In one corner, a very old man and a very young one were arguing heatedly about what the results of a chromatography test indicated about the authenticity of some artifact.

In other words, a typical back room that would have been right at home in an active museum anywhere. Big museums just had more of them.

Mrs. Snodgrass waddled briskly down a particularly narrow aisle between tall oak cabinets and stopped to open one with one of many keys on a ring. Behind the door, shallow drawers ran from floor to ceiling, each labeled with a code number. Mrs. Snodgrass pulled one out and took it to a table at the end of the aisle.

She sat down and this time Raul followed her example, peering into the drawer. Six birds lay there, their plumage bedraggled and faded, but unmistakably passenger pigeons.

Except that each of them had only one leg.

"This is our entire collection," said Mrs. Snodgrass. "One of my predecessors, back around the turn of the century, had the foresight to recognize that the species was in trouble and began discreetly collecting whatever dead specimens he could. He tried to make sure nobody killed any expressly for the collection, but of course we can't be sure how well he succeeded in that."

"I see. Were any whole birds taken, Mrs. Snodgrass?"

"No. Just the legs. Pretty sick, don't you think?"

"Quite." Raul studied the birds for a while without speaking. Even one leg would provide a goodly amount of genetic material for "Johnny Birdseed" to work with. Taking them from six birds would provide genetic diversity and improve the viability of his cloned flock.

Johnny knew what he was doing.

Of course, it was *possible* that what had happened here had nothing to do with what Shirley and Bubba and Clarissa and Schemmy had seen. But it didn't seem at all likely. Raul's trained intuition said that Shirley's lead was indeed exactly what he'd hoped for.

"May I ask how long you've been director, Mrs. Snodgrass?"

She laughed merrily. "Oh, it seems like forever, but I never get tired of it. Actually, I guess it's been just shy of twenty-six years."

"Could I ask you to do me a favor? Could you check your records and see if there's been a break-in in the last ten years or so?"

"I don't need to check records, Mr. Rivera. I'd remember anything like that. There just hasn't been any, the whole time I've been here. And I was here as a research assistant even before I became director."

"I see." *An inside job*, Raul thought. "Well, Mrs. Snodgrass, you've been very helpful. Would you mind if I collected fingerprints from this drawer and its vicinity, to compare with our files? And it would be very helpful if your staff would let me take their fingerprints, just for the record. I can't require them to, at this point, but their cooperation would be appreciated. . . ."

She stiffened just visibly at that, but said, "I'll ask them, Mr. Rivera."

Mrs. Snodgrass and all seven of her staff, both paid and volunteer, cheerfully gave their prints. In a way, that was disappointing: it suggested that none of them had anything to hide. (Though it could also mean that one of them had done his or her dirty work with the skill and care that became second nature in museum work.)

Back at the lab, it didn't take long to discover that none of the prints around the pigeon drawer matched any known criminal. Nor did any of them match present employees or volunteers, which suggested that nobody went near the pigeon drawer very often. That was hardly surprising, and was corroborated by the small number of prints of *any* kind around the pigeon drawer.

But there were a few—and the feeling persisted that Mrs. Snodgrass's missing pigeon legs were significant, and that whoever had taken them had worked there. If not now, then a while back.

So two days later Raul found himself back at the museum to ask about *former* employees and volunteers.

This time he had official authorization, in case he needed it. He had Schemmy's dead pigeon safely tucked away in his freezer, and he'd finally nerved himself to show it to his supervisors in both the DEC and the sheriff's office. That was enough to create a reasonable suspicion that genetic engineering was being done that didn't comply with the embryonic regulations that were emerging to control that field. That, in turn, was enough to get him a piece of paper that would let him demand to see personnel records, if necessary.

As it turned out, he didn't have to. Mrs. Snodgrass was again very cooperative—so much so that he felt morally if not legally obligated to give her at least a hint about why he kept bothering her. "Our suspicion," he told her as he thumbed through manila folders, "is that somebody has been trying to extract DNA from your samples, with the hope of reconstructing the bird itself."

She nodded with a faint smile, but no surprise. "I suspected as much."

Raul smiled back. "I suspected you suspected." He flipped through a couple more files, then stopped, staring intently at one. "Hm-m-m, this one's interesting. Do you remember a John Chaplin?"

"Ah, yes." Mrs. Snodgrass leaned back in her chair and stared up at the ceiling. "An interesting fellow, but a bit strange. Came here in '86 or '87, as I recall, as a general lab assistant. An excellent one he was, too, and versatile. He could do anything we asked him to, and never grumbled about what we chose. He did good work in every department, one time or another."

"Did he ever work with the passenger pigeons?"

"I don't think so," said Mrs. Snodgrass. "Birds, yes. But I don't remember anybody ever even opening that drawer during my tenure—until now."

"It's just possible," said Raul, "that we could check that directly. Do you think it's likely that his fingerprints might be on file somewhere?"

She laughed. "I can't imagine why they would be—unless his parents got in on that fad of fingerprinting kids in case someone abducted them. I certainly can't picture the John I remember doing anything to get in trouble with the law." She frowned. "Yet here you are."

"Yes, but we haven't established that Chaplin's who I'm looking for. I take it he was a quiet type?"

"Oh, yes. Quiet, polite, pretty much a loner. You might not think of museum workers as a sociable lot, but we do have our own camaraderie. We tend to have wildly eclectic interests and tastes, and most of us like to get together and share them from time to time. But John was usually off on the sidelines even then." She frowned again. "I often had the feeling there was a lot more going on in his head than he told us about. He was very bright, Mr. Rivera, very bright indeed. I often wondered why a man his age would come to us for the kind of job he did." His age, Raul noted from the resumé, must have been in the late forties at the time Mrs. Snodgrass was talking about. "He could have been a full-fledged research scientist," she was saying, "if you want my opinion. But whenever I tried to feel him out as to why he'd never become one, he managed to steer the conversation in another direction—or slip out of it altogether."

"Very interesting," said Raul. "Do you know where he is now?"

She shook her head. "No. Never heard a word from or about him after he left here. Right around Christmas of '90, I believe. Didn't say where he was going."

"Did he say *why* he was going?"

"No, he didn't. But I seem to recall that he became even more withdrawn, and occasionally moody, after an uncle of his died in '89. I'm not sure why. I'd never heard any indication that he was especially close to the uncle, and I'm pretty sure he received a substantial inheritance." She laughed. "I hadn't seen him spending much of it. Maybe he finally decided he could afford to take early retirement, and just did it."

"Sounds reasonable." Raul closed John Chaplin's folder and shoved the pile back across the desk. "Thank you very much, Mrs. Snodgrass. You've been very helpful. I may want to look at more of these later, but for now I think I'll just see if I can find out more about this Chaplin chap. I notice the file says before he came here he worked for a genetic engineering company—"

"Yes. He did tell me why he left there, by the way. He didn't like industry's constant pressure to produce, and thought the atmosphere at a small museum would be less stressful."

"Makes sense. His file also lists hobbies of pigeon-raising and 'tinkering.' Put that together with what you've told me, and I think there's a very good chance he's our—"

Mrs. Snodgrass held up her hand with a wince of alarm followed by a grin. "Don't say it. But you may well be right. Good luck, Mr. Rivera."

Driving back to his office, Raul felt a strong conviction that he was onto something. Even Chaplin's name seemed to tickle something not quite identifiable in his subconscious archives. . . .

Back at the office, he tried some more accessible files. A few keystrokes at his PC would take him with negligible effort into DMV records and half a dozen other databases.

He barely had the first opened up when the phone rang. "Hi," said a lively and almost too familiar young female voice. "Shirley Ching. Any luck finding Johnny Birdseed yet?"

"Not yet," he said, which didn't stretch the truth enough to bother him. A little irritated at being interrupted in the midst of his efforts, he almost asked her if she'd had any, but thought better of it. "I'll let you know."

"OK," she said. "Don't forget. 'Bye."

They both hung up and Raul turned back to the computer. A moment later he had two hits: a driver's license and a registration for a fairly sizable truck, with a consistent address.

In his jurisdiction. What luck! Johnny Birdseed could have lived anywhere. There was no reason to expect his base to be near where Raul lived and worked, or where the people who'd reported to him had seen their pigeons. On the other hand, it had to be *somewhere*, and Raul doubted that he was the only law officer investigating such reports.

But maybe he'd be the one who got lucky. . . .

The address he'd found was a forty-minute drive from his office, near the edge of one of the less prosperous little hamlets in the Catskills. It was a little house with gray clapboard siding and an unkempt postage-stamp lawn of tall weeds. It might once have been nice, in an unpretentious way, but that time seemed a distant memory. The name "John Chaplin" was still on the mailbox, but otherwise the place looked quite abandoned.

Nevertheless, Raul both rang and knocked several times.

Eventually a door opened, but not the one he was knocking on. A grizzled old man came out on the porch of the house next door, still in his bathrobe. "Yer wastin' yer time, Officer," he said with a toothless grin. "He don't live there no more."

"Oh. Do you know where he went?"

"I sure don't." Both accent and idiom suggested origins elsewhere, maybe Virginia or Kentucky.

"Does anybody live here now?"

"Nope. Still got Chaplin's name on the mailbox, don't it? All it ain't got is Chaplin."

"Right. Well, thanks, Mister."

Raul rang every doorbell on the block. None of the neighbors had any idea where Chaplin had gone, or had known much about him while he'd lived here.

So it was back to the office and into the databases. The house was still registered in Chaplin's name, and its taxes were paid up. So were Chaplin's income taxes.

OK. Lots of people don't report address changes as promptly as they should, especially to the DMV. But why would he keep paying taxes on a place he wasn't occupying or maintaining?

Obviously, because he could afford to, and he didn't want to attract attention to the fact that he was actually living somewhere else. But where?

The official records, it seemed, weren't going to get him anywhere. On paper, Chaplin was still living all nice and legal in his house on Sassafras Street.

Only he wasn't. As the old man had said, "All it ain't got is Chaplin."

"And all I ain't got," Raul muttered to himself, "is a lead that actually goes anywhere."

Unless . . .

Designer Genes, Inc., was *not* in Raul's jurisdiction. It occupied a shiny modern building of glass and steel that sprawled over a flat half-acre, out in the country but closer to Albany than Raul usually cared to get. Everything inside was sleek and shiny, too, with a faint but pervasive odor of chemicals—industrial with a slight admixture of agricultural.

Even the personnel office, where Raul faced a prim and mildly hyperactive young man who insisted on being called "Mr. Dillingsworth." Mr. Dillingsworth seemed visibly flustered by having a visitor in uniform, even from another county. "You have to understand," he said, "that Mr. Chaplin left before I arrived. So I'm really not in a position to tell you anything about him that's not in the file. And you've already looked at that."

"Yes, I understand. Actually, Mr. Dillingsworth, I'm more interested in what's *not* in the file. Could I talk to Mr. Chaplin's supervisor?"

"Well, I suppose that could be arranged." Dillingsworth reached for the phone, and a few minutes later they were joined by Carol Dziemanowicz, a stocky woman of fifty or so with curly red hair, ornate glasses, and a smudgy lab coat. Raul would have preferred meeting her right in the lab where Chaplin had worked, but Dillingsworth said they normally didn't allow outsiders into the labs for reasons of sterility and security. Raul didn't press the point; a lab visit could be arranged later, if necessary.

"Carol D," as she suggested he call her, proved easy enough to talk to. The John Chaplin she remembered from his four years here was a good match for the one Mrs. Snodgrass remembered: competent and conscientious, brighter than he needed to be for the job he did, older than most of the others, and inclined to keep to himself. No, Carol D had never been to his home. No, she didn't recall that he appeared to have any close friends among his coworkers.

"Although," she added after a moment's reflection, "there was one young man he sort of took under his wing, a technician right out of high school. I occasionally saw them off in a corner, talking and joking. Birds of a feather, I suppose—no pun intended. Neither of them seemed to talk much to anyone else."

"Do you have any idea what sorts of things they talked about?"

"Well, I overheard a snatch here and there. All very innocuous. Sometimes John seemed to be trying to cheer young Eddie up by telling him anecdotes about some experience he'd had that paralleled some problem Eddie was wrestling with. I sometimes had the feeling John felt that he saw some of himself as a younger man in Eddie, and hoped to help him through rough spots he hadn't handled too well himself. Sometimes that was quite obvious. Eddie was pretty insecure, as young people often are. Sometimes he'd get rattled by one of the vagaries of corporate life, and John tried to help him relax, put it in perspective."

"I gather," said Raul, "there was quite a difference in their ages. Yet wouldn't you call what you're describing to me a rather close friendship?"

"Oh," said Carol D thoughtfully, "I think that would be stretching it. I think the best word for their relationship might be 'avuncular,' and not all that close. I really don't believe it extended beyond these walls, or after hours."

"I see." Raul pondered briefly, then asked, "So what became of Eddie? I think I should talk to him."

"I'm afraid that won't be possible," said Carol D. "It was a sad case, really. He was such a nice young man. He worked for us for a while, then announced he'd been saving his earnings and was quitting to go to college. I understand he was doing quite well, but halfway though his first year he died in a car crash."

"Tragic," Raul observed, without adding, *Disappointing.* After a discreet pause he added, "What were Eddie and John working on?"

"Oh, bits of this and that. I suppose the most important project they were working on was the one on poultry cloning and growth acceleration. No doubt you've already started enjoying the benefits of that, if you like chicken or turkey or duck. Some of the more progressive farmers have already gotten away from natural breeding and started using our methods. The old way, even if you'd developed a spectacular breed, there was always the waiting and a certain amount of gambling on how well its good traits would carry over to the next generation. We eliminate that, and that means more money in the farmer's pocket. These days, most of them need it."

He'd certainly heard that often enough from Schemmy. He hadn't realized that poultry breeding had come to this already, but it certainly fit well with his guesses about Johnny Birdseed. Trying hard not to let his excitement show, Raul asked, "A rather delicate question. Did Eddie ever get into any trouble with the company, either while Chaplin was here or after he left?"

"No. Certainly not."

"This one may be even more delicate, but it's important. Is it possible that he could have done something that would have got him into trouble if you'd known about it, but you didn't?"

Carol D frowned. "I'm afraid I don't follow you. What sort of something are you thinking of?"

"Well, suppose, for example, somebody on the outside gave him a small sample of something and asked him to slip it in among some other gene sequencing work he was doing. Could he have done that?"

For the first time, Carol D looked flustered. She actually blushed, and Raul noticed Dillingsworth watching her most attentively. "I suppose it's conceivable," Carol said, choosing her words with obvious care. "More so then than now. This is a young field, Mr. Rivera; we're still learning how best to do it, but we've already learned a lot. In the earliest days security was pretty slapdash, I'm afraid. It got a lot tighter when the public began to get an inkling of what we were doing, and got scared. We got more careful, and then perhaps a bit less so when the idea of gengineering began to feel old and familiar. Recently, of course, it's gotten tighter again, since the federal and state governments are finally starting to assemble some coherent regulations.

"So: I don't think what you're describing could happen easily now, but it's just conceivable that it could have then. Mind you, I don't think either John or Eddie would have been involved in such a thing."

"Of course." Privately, Raul was not nearly so sure. It could explain so much, so easily: John Chaplin quitting to play Johnny Birdseed, snitching DNA samples from an obscure museum, getting an impressionable young man to use company facilities to get them to the embryo state in return for help financing college....

Yes, the *how* was beginning to seem almost easy. *Why* still baffled Raul—and he still had no real clue as to *where*.

"Just one more thing," he asked Carol D. "You've told me Chaplin wasn't close to anyone here, with the possible exception of Eddie. Did he ever mention anyone outside? Either friends or relatives?"

She concentrated. "Well, he did occasionally mention a college roommate he'd had. He only had two years of college, you know. But sometimes he'd talk about how he and this roommate used to sit around in their dorm room talking about how they were going to change the world. And then he'd shrug and laugh about how they never did."

It was a long shot, but "I don't suppose you remember the roommate's name?"

Carol laughed. "Hardly!"

"But the name of the college . . . ?"

"That should be in John's file."

Mellard College was, just barely, on Raul's official turf. So he had no hesitation about telling its alumni office that one of their less illustrious alumni was missing and Raul hoped his roommate could help trace him. That established, the staff there were more than happy to assist a fellow official in the line of duty. Happily, Richard Korpi was a Good Alumnus who kept in touch and contributed regularly. So he, at least, was easy to find.

He was not easy to visit; he lived in Oregon now, selling insurance. So Raul talked to him by phone, with none of the visual clues he would have gotten from a face-to-face interview.

It turned out that Korpi had not seen Chaplin in several years and was not at all sure where he was or what he was doing now. Lately, it seemed, they hadn't even been writing.

"But you did correspond earlier?" Raul asked hopefully.

"Oh, yes—though less and less as the years went by. You know how it is. It's hard to keep even a good friendship going when you never see each other."

"Uh-huh. Would you describe yours as a good friendship?"

"I think so. We enjoyed each other's company, we shared dreams, sometimes we helped each other across rough spots." Korpi was silent for several seconds. "If you do find him, I'd appreciate if it you'd tell me where. I'd like to try to get in touch, maybe get together again—no matter what you think he did."

"I'll do that," Raul promised. "Do you remember when you last heard from Mr. Chaplin?"

"I believe it must have been the Christmas card I got from him in '89 or '90. Must have been '90, because the summer of '89 was when his Uncle Steve died and left him a wad of money. Johnny told me about that in his Christmas card that year, and—"

"You called him Johnny?"

"Yes, he liked that. Seems when he was little he heard the story of Johnny Appleseed, an eccentric character who wandered all over the country in pioneer days planting apple trees. His real name was John Chapman, and the Johnny I knew got a kick out of how similar that was to his own name. Seems this Uncle Steve was always telling him how bright he was and urging him to make something of himself when he grew up. Johnny looked at Uncle Steve's idea of making something of himself, which seemed to mean being a corporate tycoon, and decided that wasn't for him. When he heard about Johnny Appleseed, he told his uncle, 'Maybe I can do something like that.' Uncle Steve was not amused."

Even though all he really had so far was a hunch, Raul was feeling more and more confidence that he was right. "Would you say they were close?" he asked.

"They had been, to a certain extent. Johnny always looked up to Uncle Steve, yet felt uncomfortable with the pressure to Achieve Big Things in Uncle Steve's way. He was crushed when Steve ridiculed his remark about Johnny Appleseed, and they sort of drifted apart after that —mostly. Johnny wanted to be a chemist, but through a series of family misfortunes and bureaucratic snafus, he never finished college. At first that bothered him, but that faded. He found he could be quite happy working in other people's labs, even though every few years Uncle Steve found some excuse to needle him about not making more of himself.

"Then Uncle Steve died, and left him that money—with a snide crack right there in his will, read out loud in front of all his relatives, that Johnny could use it as seed money to finally make his mark on the world, or just take it out of pity. Johnny wrote me a long letter with his Christmas card that year, about what a mean thing that was to do. I had to agree with him, and I could tell it bothered him even more than he said in words. I wrote back, very sympathetic—"

"Do you know what he did with the money?"

"No. I didn't hear from him again until the next year's Christmas card. That one had just a very short note with it. I believe it said, 'Remember that challenge in Uncle Steve's will? I just might do something about it.'

"And that was the last I heard from him."

"Well, that may help more than you realize, Mr. Korpi. Thanks very much for your time. Just one more question. Do you know Uncle Steve's full name?"

"Yes, of course. Stephen Douglas Beyers."

Raul recognized that name from business sections of the newspapers, even though he rarely did more than glance over them. He wished he actually felt as optimistic as he'd sounded about how much good it might do him.

It did let him find out the exact size of the inheritance. Raul doubted it would be enough to fund the whole process of recreating flocks of passenger pigeons, if Johnny had to do the whole thing himself. But if he had a friend like "Eddie," with a good lab job in a gengineering company where security wasn't as tight as it might be. . . .

It just might be done—even if "Eddie" had to be paid.

Raul spent a little more time in the probate and real estate databases, to see what else Uncle Steve had bequeathed, and to whom. Nothing he found rang bells.

He leaned back in his desk chair, chewing on a pencil. The question of *why* still gnawed at him. So much he had heard fit together so well that he was spending less and less thought on the possibility that the person he was seeking could be anyone *other* than Johnny Chaplin. *Why* seemed increasingly the main issue, and asking Johnny should be the best way to answer that.

Assuming he could first answer *where*.

Stirred by the self-reminder that the mysterious pigeon breeder just might be somebody else, he leaned forward and punched out a number on his phone. A moment later he had Shirley Ching on the line. "Hi, Shirley. Raul Rivera. I just wondered if you or your club had turned up any new leads on our pigeon breeder."

"No, we haven't. Sorry." Her voice sounded uncharacteristically cool. "Do you have anything new on the one we had?"

"Maybe a bit," he said. "How about you?"

She didn't answer for a few seconds. "What do you mean?"

He chuckled. "Well, surely you're doing your own investigation. Aren't you?"

"Maybe. Maybe not."

"Well, good luck if you are. And keep me posted if you find anything."

"You, too. You promised."

"Right." He hung up. She had seemed sufficiently unnerved by his question to strengthen his suspicion that she was making her own attempts to follow up the Riley Creek Historical Society lead. He was far less sure that she would be in a hurry to share anything she found.

He could think of one more thing to try right now—an obvious thing, perhaps too obvious. If John Chaplin was as bright as everybody said, and really determined to disappear, it was unlikely that he would be still driving his own truck with the plates that were registered to it.

But it was worth a try. Even if Chaplin was bright, Raul had the impression that relatively little of that brightness might be spent on the finer points of criminal elusiveness.

So Raul got on the sheriff's radio and gave all his colleagues the number and vehicle description. "Not top priority," he emphasized, "but if you see it and have time to follow it, I'd like to know where it goes. Please *don't* apprehend. Repeat: do not apprehend."

To his considerable surprise, it paid off the next morning. He was out patrolling himself when the call came in. "He's turning down a dirt road," Dan Vogel radioed, and gave the number. Raul called it up on his dashboard navscreen and visualized the location: deep woods, rough terrain. Moonshine country—but he seriously doubted that that was what the truck was headed for. Dan was asking, "Do you want me to stay with him?"

"Long enough to see where he goes," said Raul. "Keep me posted, and I'll take it from here."

He took the next right, reached up to flick on siren and lights, and floored the accelerator with an anticipatory grin.

It wasn't until he was halfway to where Dan had called from that it occurred to him that Shirley's investigation might include monitoring police radio.

Onboard computers made police work easier in lots of ways. A warrant printed right out of the dash even as Raul barreled toward his quarry, and the monitor screen kept him on the right route and let him know how close he was. Meanwhile somebody back at HQ went back to the real estate records, this time with the address Dan Vogel had radioed in.

Raul shut off the siren and flashers and slowed to normal speed two miles before Dan's turnoff. The sudden quiet seemed eerie, but didn't last long. The narrow dirt road was rutted and rocky, and sumac and laurel branches often scraped the sides of the car. He was moving a lot slower here than on the highway, but his heart was pounding with the conviction that, slow or not, this was the home stretch.

He'd had the windows open on the highway; except for an occasional brief cold snap, it was shaping up to be another warm fall. On the forest road, he closed the windows and ran the air conditioner until it got too steep. In days of fatter budgets, the road had been graveled and oiled regularly, but now it was dry and loose and he was churning up a humdinger of a dust cloud with his passage.

There were plenty of ups and downs and rocks and potholes, but the overall trend was very much *up*. The hardwoods up here were already bare skeletons, their color peak long past, but there were plenty of hemlocks and occasional pines to preserve the feeling of seclusion.

Four point six miles, Dan had said. Raul glanced at the odometer; he had come almost four. He'd passed exactly two recognizable driveways in that distance; one had a cabin visible at the far end, the other didn't. Time to start watching. . . .

The radio crackled and Betty came on from HQ. The driveway Chaplin's truck had turned down belonged to one Simon Gill, a cousin of Chaplin's who'd inherited it from good ol' Uncle Steve. Raul could make a pretty good guess how that worked, too. Cousin inherits remote land, doesn't want to be bothered with it; Johnny gets a hideout by reimbursing cousin for its taxes and utilities.

And there it was: the twin stone chimneys that Dan had said marked the driveway, towering out of a thicket of laurel. Raul slowed, found the rutted driveway, and turned. A four-point buck sprang from the bushes and barely missed his fender before disappearing again. Raul found it comforting to know that Dan was waiting a mile farther down the road, so Chaplin—or whoever was driving his truck—must still be in here.

The driveway was even worse than the road, and a full mile long. It wound through a particularly dense hemlock grove, with a stream tumbling audibly over boulders in the ravine to the left. . . .

And emerged suddenly into bright sun, a sizable clearing full of tall goldenrod that was past its prime, and topped a rise. As he started down the other side, Raul became aware of several things at once: the fact that the clearing was not really all that big, that several structures hugged the edge of the woods around the dead end of the driveway, and that another dust cloud was obscuring the view of the whole place.

The car in front of him stopped abruptly, right behind the big van he'd been looking for. As he pulled up closer and the dust began to settle, "car" resolved itself into one of the sportier Nissans from the mid-eighties. Its door flew open and Shirley Ching emerged. She threw him a quick and probably scornful glance, then dashed toward the most houselike of the several shacks clustered in the clearing.

Raul shut off his engine, got out, and ran after her, scanning the scene as he went. Yes, the shack Shirley had run up to and entered without knocking was probably where Johnny lived. Some of the others were equipment sheds; he could hear a generator chugging in one of them, partly masking the shouts in the shack. But several of the structures looked like high-tech chicken coops, with sides that could be rolled down and a locked metal cabinet on the end of each one. A soft, almost bell-like cooing drifted this way from them, along with the pungent odor of poultry on the hoof.

Raul stepped onto the rickety porch of the house and knocked. "Sheriff!" he called out.

But even as he did it, he heard the back door slam, and then the two voices, male and female, came from outside, around back. He ran to the back and saw them: Shirley and the man he guessed was Johnny Chaplin. Chaplin looked younger than he expected, a slender man with long, stringy brown hair and wire-rimmed glasses. He had unlocked the cabinet on the end of one of the pigeon coops, and evidently given an extra key to Shirley, who was unlocking another. They each threw some sort of a switch inside, and all the individual cages on those coops flew open with a loud snap. Then they each ran to one of the two remaining coops and started to do the same.

"Hold it right there!" Raul yelled. "Don't touch those."

But he was too late; they already had. Those cages, too, flew open, and the pigeons inside began thinking about joining those already streaming out of the first two coops. Soon the air overhead was filled with them, milling about in the air over the clearing before deciding what to do next, their wings whirring like wind through sails.

Shirley watched them with wide eyes. "You're too late, Raul!" she crowed. "Did you really want to stop this? Have you ever seen such a miracle?"

A detached part of Raul's mind looked at the birds and agreed with her. *Those are passenger pigeons!* he thought with something like awe. *Hundreds of them!* It was a sight he had never, until a couple of weeks ago, dreamed he might ever see, and there was a heady excitement in it. For the first time in his life he *realized* what he had told Shirley and Schemmy and Bubba: that extinct is not necessarily forever. His mind's eye extrapolated the hundreds of milling pigeons to the millions that once filled the sky, and wondered if someday he might get to see that, too.

But that thought snapped his mind back to the reality of the potential danger in that vision and the job he had to do. He forced his eyes back to John Chaplin and started toward him. Chaplin was struggling with one cage door that had failed to open, trapping two or three pigeons inside. That was good; Raul could use a couple for evidence. "Stop what you're doing and put your hands up," he said in his most official tone. "You're under arrest." Chaplin complied, a look suggesting astonishment on his face. "You have the right . . ."

He recited the Miranda rights from memory; it had been a long time since he'd had to read them. He snapped handcuffs on Johnny's slender wrists as he did it, and then his voice softened abruptly. "Why, Mr. Chaplin? Why did you do it?" He frowned. "Never mind. You don't have to tell me. I've just told you why you shouldn't."

"That's all right, Officer. And please call me Johnny." Johnny looked Raul right in the eyes; his voice was startlingly gentle and calm. "I *want* to tell."

"You do? But—"

"I'm not ashamed of what I did. It's probably the best thing I've ever done, and I want to be sure everybody understands." He looked toward the empty coops and bit his lip. "I only hoped I'd have time to take this last bunch south before I released them. I hope they'll be all right, this far north and this late in the year." He looked back at Raul. "Can we go in the house for a moment? I want to show you something."

They went in, Shirley frowning and hesitating slightly before following. The house felt as tiny inside as out; a musty smell of age emanated from its walls, and when Johnny led them into the kitchen, its walls were lined with canned goods except where an ancient gas stove and small refrigerator stood.

"It's kind of a long story," Johnny began, sounding vaguely apologetic. "But when I was little I wanted to be a scientist, and I had this uncle—"

"I know about Uncle Steve," Raul interrupted, more roughly than he intended. "And the will, and your work for Designer Genes and the museum. Even Eddie." Shirley might not, but Raul didn't want to listen to all that again just now, even from Johnny. He just wanted to know *why*.

"Oh," said Johnny. "Well, then . . ." He sidled over to the refrigerator and, his hands being occupied, used his elbow to point at a newspaper clipping held to the door by two bug-shaped magnets. The date was June 1990; it had been kept long enough to turn yellow, then laminated in plastic.

Raul read it. So did Shirley, despite some show of reluctance to get that close to Raul. The gist of it was a theory some biologist had had, that the extinction of passenger pigeons was not just a historical curiosity and embarrassment, a monument to human stupidity, but a potential tragedy in view of the mounting evidence that the Earth's greenhouse effect was getting out of hand. The pigeons, the biologist had claimed, had been an important agent of seed dispersal. If they were still around now, they could have helped forests spread northward in response to the warming climate. Without them, the process might be much harder.

"Steadman just thought of it as an object lesson," said Johnny, "as something to make us think harder about wiping out other species. But I saw it as something I could *do*." He laughed wryly. "I guess you could say I was having a mid-life crisis then. Even though I was pretty happy with what I was doing, that snide remark in Uncle Steve's will got me thinking again about trying to do something more important. Then I saw this article and a little light went on in my head, just like a comic strip. I realized we *could* have passenger pigeons. I was already working at the museum then, and I knew they had some passenger pigeons and never did anything with them. I didn't think they'd miss some small parts, especially for such a good cause. And I knew what kind of facilities they had at Designer Genes, and that they were already working with avian cloning. I was already raising regular pigeons, just for relaxation, so I knew how that was done. All I needed was a small favor from somebody at DG. . . .

"So here we are. And there"—he tried to sweep an arm around him but was foiled by the cuffs—"*they* are."

Raul found himself curiously moved by the tale. If the article made sense—and it sounded quite plausible—then so did Johnny's scheme.

If it could be carried out without *its* getting out of hand. "Well," Raul said, "your heart's in the right place, and it just might work. But why didn't you apply for permission to do it legally?"

Johnny laughed without much humor. "Officer, right now I estimate there are over a thousand passenger pigeons living in the wild. If I'd tried to do it legally, do you honestly think we'd have even one egg yet?" He shook his head. "It needed *doing*, not hemming and hawing."

He certainly had a point there. But . . . "I hear what you're saying. But we can't just have anybody who wants to turning whatever they want loose on the environment. Remember, when there were lots of pigeons before, there were also lots more forests and lots more predators. Unleashing them now, without those things, is likely to cause all kinds of problems."

Johnny shrugged. "So you'll have to solve them. Things like protection at the start and controlled hunting phased in as their numbers grow. I know that, Officer. But with the birds already out there, you'll at least try to solve them, because you have to. If I'd asked first, you'd still be arguing about whether to risk it twenty years from now. And we *need* big flocks of pigeons. We have to figure out how to help them help us. I know that volcano in the Philippines a few years ago is supposed to slow down the greenhouse effect, but that's temporary. It will buy us some time, but that's all. And we'll need time to get enough pigeons."

Raul was silent for quite a while. The silence seemed profound, with most of the pigeons having flown away. Finally he said, "Well, I hope you're right, but that's not for me to decide. I'm still going to have to take you in. Meanwhile, maybe we can make sure at least *some* good comes of this. . . .

Clarissa Murray was sitting by her usual window, shawl drawn around her and face as blank as Bubba had described it, when they went to see her. All of them: Bubba, Shirley Schemmy, Johnny (out on bail), and Raul. Bubba went first, to ease the shock. It had been a long time since Clarissa had this much company, and Bubba wasn't sure how she'd take it.

He sat down next to her and laid a big hand lightly on her shoulder. "Mrs. Murray?" he said softly. She kept staring out the window. "Clarissa?"

Very slowly, she turned her weary, lined face toward him, but its expression didn't change. "You've got company. All these people have come to see you."

She showed no sign of understanding, but she didn't turn back to the window. Bubba told her, "We brought you something." Then he nodded to Johnny.

Johnny stepped forward slowly and knelt next to Clarissa's chair. He set the big cage he was carrying down on the floor, carefully removed the cloth that covered it, and reached inside. Very carefully, very slowly, he took out the single passenger pigeon inside and moved it over to Clarissa's lap.

Her eyes followed it. It looked around and clucked softly, then stepped lightly from Johnny's wrist to hers and started that rhythmic, bell-like cooing. "His name is Bob," Johnny told her.

Clarissa looked startled. Then a hint of a smile appeared on her lips and grew gradually into a huge grin that she swept like a searchlight over all her visitors. Each of their faces reflected it, and soon it filled the room. ■

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Red Mars, Kim Stanley Robinson, Bantam, 461 pp., $22.50 hc (ISBN: 0-553-09204-9), $11.00 pb (ISBN: 0-553-37134-7).
The Gripping Hand, Larry Niven and Jerry Pournelle, Pocket Books, $22, 402 pp. (ISBN: 0-671-79573-2).
The Singularity Project, F. M. Busby, TOR, $21.95, 349 pp. (ISBN: 0-312-85443-9).
Elvissey, Jack Womack, TOR, $12.95, 311 pp. (ISBN: 0-312-85202-9).
The Dragon at War, Gordon R. Dickson, Ace, $18.95, 375 pp. (ISBN: 0-441-75698-0).
Dragons and Unicorns: A Natural History, Paul and Karin Johnsgard, St. Martin's Press, $6.95, 163 + xii pp. (ISBN: 0-312-08499-4).
Stainless Steel Visions, Harry Harrison, TOR, $18.95, 254 pp. (ISBN: 0-312-85245-2).
In Our Own Image, Maureen Caudill, Oxford University Press, $23.00, 242 + x pp. (ISBN: 0-19-507338-X).

Kim Stanley Robinson's most ambitiously sweeping, grandiose, Stapledonian work to date *begins* with a thick novel titled **Red Mars.** In due time we will see *Green Mars* and *Blue Mars,* and those titles alone are enough to give you some sense of what Robinson is up to.

Red, of course, is what Mars is now, the desert Red Planet, its atmosphere too thin and too dominated by carbon dioxide to be breathable; its supposed waters locked in the depths of an impact-shattered regolith; its climate frigid enough to justify the old crack that "it was so cold the mercury slid two feet down the hoe handle." Yet for all its rigors, the Red Planet has long exercised a powerful attraction to humanity. It thus seems quite likely that we will someday, even the generation hence Robinson posits, send a hundred of our species' finest there to build a colony and begin the long process of thickening and oxygenating the atmosphere, warming the climate, and moistening the soil.

"Our species' finest"? Well, they passed all the tests. They're scientific superstars. But they're also a little strange, some of them, self-centered, self-driven, willing to leave everything behind. They even admit to each other that they lied when they took the tests. And it doesn't take long to see signs that the mission to colonize Mars could come apart at the seams: Here is Arkady, the rampant idealist and joker; Hiroko, the biosphere designer and recluse who tends the gardens in which a stranger (of all unlikely things!) has been seen; Nadia, the tech who fixes everything; Sax, the gung-ho terraformer who sees everything in terms of its contribution of heat or moisture to the task; Ann, who so loves Mars as it is that she becomes the first "Red" environmental activist; John and Frank, contenders for leadership whipsawed by Maya, an erotic manipulator. The potential for chaos is as huge as the potential of their genetic engineering, chemistry (so potent they call it alchemy), and robotic machinery to reshape the face of a planet.

They muddle through, of course, despite defection and bitter argument. They create dwelling places and begin to have the intended effects on Mars. And then Earth intrudes—short of everything but people, feeling that it owns Mars with its surface as great as all the land on Earth and with its mineral wealth. The UN permits more colonists to come, and then the megacorporate exploiters. A space elevator is built. Chaos comes at last, but from outside. There is riot, rebellion, revolution, wanton slaughter, destruction of habitats, tented towns, almost everything that human hands had built. The colony's attempt to declare political independence is a dismal failure. Yet, buried out of sight, a seed remains. There is hope, a hope the titles of the next two books assure us will be fulfilled.

I began this review by calling the book "Stapledonian." This adjective is apt for two reasons: First, Robinson, as did Stapledon, here pays much less attention than most writers to plot. There is such a thing here, for the book opens with a murder set just before the treaty negotiations that will set the stage for the final catastrophe. The murderer is no secret, but his motive is, and that is developed as Robinson spends about half the remaining pages leading up to the event. Yet in those pages, Robinson leaps from character to character, never sticking with a single point of view, showing us much less of human lives than of grand events. His point is the reshaping of a world; people are hardly more than footnotes, and if their motives ultimately seem a little thin and their actions futile, never mind.

The second reason to call the book Stapledonian is its concern with history. This was Stapledon's emphasis, for he loved to tell tales that swept across millennia and galaxies. And Robinson has both demonstrated repeatedly—by considering alternate outcomes of important events—and declared a fascination with the way history works itself out.

If there is a historical model here, it is perhaps the colonization of North America. Here too we see a few first settlers shaping the wilderness until it can support people in some comfort. Then come the hordes, the political pressures from outside, the exploiters, and finally rebellion. Here, of course, the rebellion is far less successful than the American Revolution—the difference in technology ensures this outcome—but the pattern remains. It will be interesting to see where Robinson will take it next.

It has been many years since *The Mote in God's Eye* made a splash in the SF community. It was a superb depiction of a species whose uncontrollable drive to reproduce led it to overpopulation and catastrophic war again and again and again. The Moties were alien beings specialized by both evolution and selective breeding into a large number of subspecies or varieties. When humans met them, they were appalled by the Moties' numbers, ferocity, cleverness, and adaptiveness. They were even terrified, and the earlier book ended with the blockade of the Motie system.

A question that Niven and Pournelle did not answer at the time was just how long the blockade could work. The Moties were both ingenious and desperate for the lebensraum and resources outside their isolated system. Surely they would find a way to escape!

Indeed. Niven's and Pournelle's Alderson drive exploits pathways established in space by the energy outputs of stars. Not far from the Motie system is a protostar expected to condense into a star—and therefore to create new Alderson paths into and out of the Motie system—a century or so hence. But wait! Here is a hint that that expectation hinges on data provided by the Moties, and an independent astronomer who has used data from a different source to figure . . . Jeez! Louise! It could happen at any moment! They could have escaped yesterday!

The Gripping Hand, the long-awaited sequel, begins with intelligence agent Kevin Renner and agent/tycoon Horace Bury on stage. Both were involved in the earlier adventure. Ever since, they have been prowling the Empire, seeking threats to its existence. Now they are poking their noses into a system where the Motie expression "On the one hand . . . on the other hand . . . on the gripping hand" (a reference to the third arm they have on one side) has become suspiciously common. Before long they are home in the heart of the Empire, listening to an astronomer, and promoting an expedition to the scene of the blockade to be sure it is working. They also want to check on the protostar, figure where the new emergence sites might be, and make appropriate arrangements if possible. There is a hint of a genetically engineered symbiote that might, for the first time in all of history, offer Moties a way to control their birth rate.

They have barely reached the site of the new Alderson emergence point when the Moties appear, asking explicitly for none other than Horace Bury. Back when, you see, a Motie Mediator, a specialist in communication that mimics the mind and personality of a particular individual (rather like imprinting), had been assigned to Bury. After the humans left, it trained or imprinted more Mediators, and the line of influence has been strong. There is hope for a peaceful solution to the crisis. But there are other Motie groups, some allied to the first group, some not, all scheming like a thousand Machiavelli clones on amphetamines. There is action aplenty, fast movement, space battles, and ultimately. . . .

I really shouldn't give away too much, should I? Suffice it to say that despite a hackneyed political backdrop (that Empire), the Niven-Pournelle touch is as sure and as golden as it has ever been. There is even a very sane and very necessary point to it all: a species' peace and prosperity depend utterly on being able to control its reproductive urge.

This is one you'll love.

If you have ever wondered why F. M. Busby is not as famous as, say, Joe Haldeman, his latest novel, **The Singularity Project,** will enlighten you. In Busby's stories, the action moves right along. The characters are adequate. The techy baffle-gab is convincing enough. But he is neither subtle nor complex, and when he poses a mystery, it isn't much of a mystery—except to the protagonist.

Singularity Project opens with protagonist and communications engineer Mitch Banning being expelled from the office of businessman Elihu Coogan with the aid of an Amazon native called Tixo. We quickly learn he is there because his journalist girlfriend has told him Coogan is trying to peddle an "Aladdin's lamp" project to local entrepreneur George Detweiler. There's no story for her since the boss killed the notion, but perhaps, for him. . . . He, you see, writes popular science articles on the side.

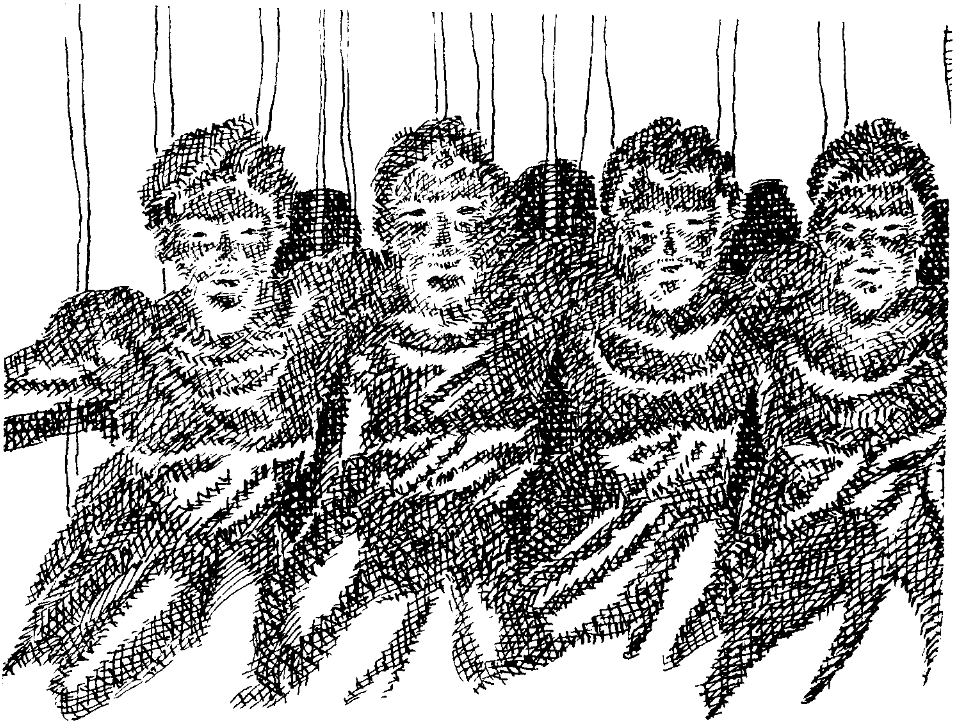
But, as soon as Banning sees Coogan, he recognizes Emil the Stork, con man extraordinaire. Using that knowledge, he gets invited to join the project. The miracle gizmo Coogan is trying to sell Detweiler turns out to be a matter transmission device. Tixo is friendly one day and hostile the next, as if he didn't recognize Banning. The suspicious reader immediately thinks, "Aha! Twins!" and sees the signs of sleight of hand to come.

And then the bombs begin to go off. People are killed. A note reveals that Coogan's white-coat boy supposedly stole the device's plans. Another note hints that the victim's son, Edsel M. ("Mac") Allert, is on the scene with nefarious plans. Careful scrutiny of the employee list—which includes an Eddie Machell—leaves Banning et al. baffled.

It's no great surprise when the villain is nailed and Coogan flees with a quarter of the book left to go. Or that the Allert heir enlists Banning to help prove the device will really work.

If you get your jollies by second-guessing a story's hero and love a hero who's too dumb to find the door under the "Exit" sign, you'll love this one. If you'd rather be kept hanging without giveaways such as clumsy pseudonyms and instantly recognizable schemes. . . . Well, Busby is good enough to keep you reading anyway. This time, however, that isn't quite enough.

(continued on page 265)



Laura Frankos

HOOFER

There's no business like . . .

Illustration by Janet Aulisio

Maureen Harrigan tugged on her companion's arm. "Wait a sec, Gina. My scarf's come loose." She tucked her umbrella under her arm and tied the scarf tighter. It was a ghastly shade of green which clashed with her red hair, but the depression had hit her family hard. She could not afford to be choosy. The scarf was a gift from her ex-roommate Sally, now Mrs. Andrew Hughes. Sally never did have much taste in clothes, so how

she wound up with Gorgeous Andy was beyond Maureen's comprehension.

"Hey, shake a leg, Maureen," Gina Fogazzaro complained. "It's gonna start raining any minute. You look at those clouds? I just hope it don't snow."

"Sorry, Gina. My brain's out to lunch. Just worrying about the beefs between our union and the stagehands'. I mean, I'm all for our side, but if we have to close the show again, I'm in hot water. And who's to say what it'll do to the show's chances even if things are settled? Will it have legs?"

"That's malarkey. You were thinking about Sally and Andy, and wishing you got him."

Maureen blushed. She had a rotten poker face. "Well, you're right, in a way. I always liked Andy, and he certainly has a future: Sally boasted that they're moving to Washington next month. Andy will be junior clerk to somebody in Roosevelt's cabinet."

"Who? Mr. Tea Kettle or Mr. Frying Pan?" Gina hooted. "You're too good for that lug, Maureen. He deserves someone dowdy like Sally. Besides, can you see leaving Broadway for sleepy old Washington? Pfui!"

"Mebbe so. But, you know, I wasn't lying when I said I was worried about the show. If it closes before I get another roommate, Mrs. Goldstein is gonna heave me out on my can."

"What's the worry? The unions will haggle a bit, get it all settled, then we're in the money. How can we lose with a Cole Porter score and that funny book by the Spewacks? And William Gaxton and Sophie Tucker and Tamara? Not to mention that little Martin gal—don't she just bring down the house every night with 'My Heart Belongs to Daddy'? This show's got plenty of legs. It'll run for a year. Besides, if Mrs. Goldstein kicks you out, you move downstairs with me and Teresa and Josephine till you find somebody to share the rent."

Maureen giggled at that. Gina and her sisters were crammed into that apartment like sardines and they quarreled constantly. She'd go mad living there, but it was typically sweet of Gina to offer. Still, the alternative was moving back with the folks, where Ma would carp at her all day about her choice of career. If Ma had her way, Maureen would either be suitably married or in a convent. Ma said it made the Blessed Virgin cry every time a girl kicked her legs in a chorus line. Of course, Maureen remembered, Ma said that about whistling and chewing gum, too. Judging from the number of shows surviving on Broadway through the depression, Our Holy Mother must be weeping non-stop. The Ziegfeld Girls, in their days, probably used up a lot of heavenly hankies.

They crossed 14th Street. Maureen was glad the apartment building was only three blocks farther. It was nearly two in the morning, and she was exhausted. Robert Alton, the choreographer of *Leave It To Me*, believed in putting his dancers through their paces. They trudged in silence, well-wrapped against the mid-November chill. Suddenly Maureen stopped. "Do you smell smoke?"

Gina sniffed. "I'm getting a cold. I can't smell nothing."

Maureen peered down 13th Street. "There! I see smoke coming outta that building! C'mon! Let's go!"

Gina grabbed her arm, her dark eyes wide and frightened. "Whassamatter? You crazy? What you think you gonna do?"

"Go help, of course," Maureen replied. "That apartment's on fire, people need to get out of there." She started running toward the scene. Gina followed, squawking vehemently in Italian.

Maureen took little notice. Her father and beloved older brother Michael were firemen, so thanks to their stories she knew more about the business than most women. She knew how important getting people out right away was—and she also knew the fire engine would take several minutes to get there. She had to do what she could to help. She simply had to. It was in her blood.

As she pelted down the block, she saw another woman running from the opposite direction, her long legs eating up the distance. They met on the stoop. The other woman was attractive, perhaps in her early thirties, wearing a waitress' uniform. Brown curls peeked out from a jaunty pink cap which proclaimed "Big Al's" in gold script. She glanced at Maureen. "I live here," she said. Her voice was deep and accented. "There are many families within."

"Then let's start getting them out!"

Maureen burst into the building, yelling for everyone to get out. The other girl did the same, her voice rumbling like thunder. As they went, they kicked open doors and hastily checked the interiors for residents. Fortunately, most people had the sense to flee as soon as they heard the commotion, but on the third floor Maureen found one family stupidly trying to hide in the bathroom. She shepherded them to the stairwell and was relieved to hear sirens drawing closer.

While she was helping the idiots escape, she saw the waitress struggle upstairs to the fourth floor, the one that was burning. The smoke filled Maureen's eyes with tears; she put the loathsome green scarf across her face to help filter it. She plunged forward, crouched low to the ground, and began creeping up the steps. A white and pink shadow suddenly loomed before her—the waitress, with an unconscious man draped across her shoulders like a sack of potatoes.

"Get out," she mumbled through the apron she had tied around her face. "There is no one else."

They plunged down the stairwell toward fresher air. The fire crew met them on the ground floor. A fireman relieved the waitress of her burden

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and hustled them to safety.

The scene on the street was pure chaos. A short fat Jew, the building's super, was running around in his striped pajamas counting heads. "Three Kaplans, six Pincuses, five Toplinskis, five Wexlers, six Fishbeins—" He broke off when he saw the waitress and ran over to her. "Dee! My Russian angel! We owe you our lives! Is Salkowitz all right?"

"He breathed the smoke, but he will be fine. The fire began in his apartment. Is everyone here, Mr. Zucker?" said Dee.

"Thanks to you and this other young lady! Though how did you know, Dee, that Benny Fishbein was hiding in his closet? It was a miracle! His mama couldn't find him anywhere! Pitch dark, and the smoke—"

Dee interrupted Mr. Zucker's praises. "If everyone is safe, then I must rescue my belongings."

"Whassamatter, you *meshugge* or something?" The little super moved to block the girl's way. "Your apartment was opposite Salkowitz's; it's a bake oven up there."

"Nevertheless, I must try. I have things up there which are . . . irreplaceable." Maureen heard cold determination in the waitress' voice.

Mr. Zucker was unimpressed. "Honey, nothing is irreplaceable except your life, and that's what you'd lose if you went back inside."

She's gonna try it anyway, the loony, thought Maureen, and her guess was confirmed a moment later when Dee slipped past the distracted Zucker and into the tenement once more. Almost as quickly as she entered, she was firmly escorted out by a scowling fireman.

"Whatcha tryin' t'do, ya dumb broad?" He shoved her down on the stoop opposite the burning tenement and dashed back to the engines.

Maureen hurried to her side. "I'm afraid your super was right; if your place was on the fourth floor, it's probably a total loss."

The girl looked shaken but she nonetheless recognized Maureen. "The girl who helped evacuate the building. You were very brave."

"Ah, it was nothing. I come from a long line of firemen. Pure instinct."

Maureen grinned at Dee in the street light's dim glow. She got her first good look at her. The pink and gold cap was askew, the white apron now soot-stained. She was of average build, with heavily muscled legs. Maureen idly wondered if she danced. Her upper body had to be strong, too, to carry an unconscious man down four flights of stairs. Dee's eyes were a faint clear gray, her complexion dark. A thick silver necklace and locket sparkled at her neck. Poor thing. That necklace was all she had left.

"Do you have any family? Is there anyone I can call for you?" Maureen asked.

She slowly shook her head. She spoke with a peculiar accent, her voice deep and husky: "I am alone in this city, a student from a different land. I have now lost all my contacts with my home. I am . . . utterly alone." And she looked heavenward, as if seeking an answer there.

No one ever accused the Irish of

being insensitive. Maureen's green eyes flooded with tears; she put her arm around the now homeless immigrant.

"You just come over to my place. It's practically around the corner. You sure don't have anything left here. My roommate's gone off and got married, so I've got plenty of room. You stay there until you get settled. I don't mind, really!"

"You are very kind."

"Piece of cake, really. So what's your name, Dee? I'm Maureen Harrigan, a hoofer in the new Porter show, *Leave It To Me.*"

"I am called Dee Charykova."

Gina shoved her way though the growing crowd of on-lookers, gesticulating as only the Italians can. "Sancta Maria, you are safe. You go in there, I think you never come out! *Stupida!* You trying to kill youself?"

"No. I found a roommate. Gina Fogazzaro, meet Dee Charykova."

"Gosh, that feels good." Maureen collapsed on her bed and kicked her shoes off. "My dogs are dog-tired."

Dee looked around the room. "I do not see any pets here. Are they housed somewhere nearby?"

Maureen laughed. "Are you kidding? Mrs. Goldstein's number one rule: No Pets. No, these dogs. My feet. We did two shows today, plus hiking up and down those stairs. Geez, I've got pooped pups!"

"I am sorry. My English is not always so good." She pointed at the other bed. "This is to be my bed?"

"Yeah. It's got clean sheets. I'll get you a nightie. We're about the same size, I guess." She stretched across the bed and hung upside-down while she rummaged in a nightstand drawer. "Here's one. Flannel for a fall night." She rolled over and tossed it at Dee. "You win the grubby contest, so you can shower first. I sure hope the soot and smoke will come clean from that blouse and skirt. Tell you what: Monday we'll go to the best dry cleaner in town, over on Mott Street. This little bald Chink can clean anything, and I mean anything! He even did a good job on Gina's sister Maria's wedding dress, which she had loaned to her best friend, who musta spilled a buffet on it. She's now Maria's ex-best friend! But don't stand there all night listening to me gab. Get in that shower, girl! Poosh 'em opp!"

Dee smiled hesitantly and went into the bathroom. When she emerged some twenty minutes later, she was scrubbed and pink, and clad in Maureen's nightgown. She was still wearing that silver necklace with the fat round locket; Maureen assumed she meant to wear it to bed.

"We'll worry about wardrobe in the morning. Now try to rest. Don't wait up for me."

But when she emerged from the bathroom, Dee was still awake, staring out the window at the sky. *It must be hard to sleep when you've lost everything,* Maureen thought.

"Charykova?" Gina pondered the name while putting on her greasepaint for that night's show. "What is that, Russian? Isn't that funny? And *Leave It To Me* is all about Russians and Americans."

"Yeah," Maureen answered. "She's only spent a year here, in Chicago. She's twenty-nine and plans to go to N.Y.U. next semester. Graduate school. Studying civilizations, she said. Whatever that means. History, I guess. She's nice, Gina. She's had a tough time, got no family here, but she's really friendly. We went to see if we could salvage anything from her apartment. Was it a wreck! Funny thing is, she wasn't too upset at the smoky clothes or burned pictures, but she got all broken up over her melted radio. Had to junk the whole thing. The people in her building took up a collection for her, and the super gave her *and me* five bucks each for helping save everybody. See, it pays to be a hero!

"Anyway, I took her to Coney Island, you know, to make her forget about her troubles. She loved it! You'd think she had never seen anything like it before. And when I told her she could eat the cotton candy—she didn't believe me. It was a riot!

"And then we went to the afternoon market on Hester Street, so she could get some dresses. She did great there, with her Russian. She bargained like a pro and got a decent wardrobe for next to nothing! Did you notice my new sweater? She helped squeeze seventy cents off the price."

Gina frowned, which smudged her lipstick. She dabbed at her lips and muttered at Maureen through her hanky. "So you're a saint, taking in the homeless. What's she do for work? Is she gonna help you with Mrs. Goldstein?"

"Sure, sure. She's got a job as a waitress at this coffee shop near the East River. Hand me that base, wouldja?"

"Hmm. I still say, be careful. You never can tell with these foreign types," said Gina, totally oblivious to the fact her own family had been Americans for less than forty years, Maureen's for only fifty.

Maureen did not heed Gina's warning. She liked the quiet Russian girl and discovered that they had much in common, despite their different backgrounds. Their biggest common love was the movies. They haunted the matinees in the East Side palaces, especially the Ruby and the Palestine. Dee seemed especially hooked on newsreels, but she was game for almost anything in the cinema. Period pieces were her least favorite; she agreed with Maureen that Errol Flynn was quite dashing as Robin Hood, but she complained that medieval England wasn't like that at all. And Maureen was disappointed to find that her friend didn't like one of the most popular films ever, *Snow White and the Seven Dwarfs*. "The painting of the picture is beautiful," she announced, "but I prefer to see real beings." Maureen, who had just watched Disney's masterpiece for the fourth time, disagreed.

Not surprisingly, considering Maureen's career, they attended a lot of musicals. They saw Eddy and MacDonald in *The Girl of the Golden West* ("They were better last year in *Maytime*," Maureen complained), Deanna Durbin in *Mad About Music*, Shirley Temple in *Little Miss Broadway*, Bob Hope in *The Big Broadcast of 1938*, and Maureen's favorite, Bing Crosby in *Sing You Sinners* and *College Swing*.

Late in December, they went to see *Alexander's Ragtime Band*. Maureen adored it. Dee admitted that Berlin's songs were splendid, but again criticized historical details while they trudged through the snow on their way home.

"This movie is about time which has just passed, before the Great War to the present. So why does it not accurately portray these times? Not even the clothes are properly done! For example, Ethel Merman's dress—"

"Aw, Dee. It's poetic license. The costumes aren't supposed to make you think of how America's changed, it's the tunes. But maybe you don't get it, coming from Russia. Who cares about Merman's dress? How about those songs? Gee, she can belt 'em! 'Blue Skies!' 'Pack Up Your Sins!' Aren't those more important than whether her dress was in style for 1918 or not?"

Dee shrugged expansively. "I have been trained to notice such details. When they are wrong, it irritates me. But I agree with you that the songs were marvelous."

"And you've memorized them all again? I just can't get over how you do that! I can learn my dance steps pretty quick, but I have to work on lyrics. You're amazing! How does that last verse in 'Say It With Music' go?"

And they walked down Broadway, voices raised in song, Maureen's reedy soprano and Dee's melodious alto.

The cast had Christmas Day off. Maureen invited Dee to join her family for Christmas breakfast at her family's home, but the Russian girl declined. Maureen had hoped Dee would come with her to act as a buffer between her and Ma—Ma was less likely to have a fit about Maureen's dancing if company were present. The meal was a disaster. It began well enough, with an exchange of simple gifts, but before the sticky buns had even cooled, Ma was laying into Maureen with a vengeance. Pa, as usual, kept out of it, but this time Maureen could not even count on her brother Michael for support. Michael had always rallied to her side before. This time, he sat in uncomfortable silence on the couch. And Maureen knew why: his new wife Bitsy was as prim and proper as they came. Having him abandon her was too much for Maureen. She said some things she knew she'd regret later, then fled for her dingy flat on 12th Street and dear, unassuming Dee.

The foreign girl, for once, was not glued to the radio. She sat by the window, twisting her locket back and forth. She noticed Maureen's red and swollen eyes at once.

"Something is wrong? You are hurt?"

"No. Yes. No. It's just Ma. She doesn't know how much it means to me, being on Broadway, how much work it is. It's all a sin to her. Ah, I don't even want to think about it." She flung herself on the bed, dabbed at her eyes. "Geez, I bet I look like I've been tying one on!"

Dee studied her. "Tying what on?"

Maureen laughed. "Something I'd love to do right now, only I probably shouldn't, it being Christmas. I got a better idea. The Windsor is showing a Busby Berkeley *spectacular this afternoon.* The films are a couple of years old, but I bet you never saw 'em. And let me tell you, they're great: *42nd Street, Gold Diggers of 1933,* and *Dames.* How'd that sound to you?"

"These are more musicals?" Dee questioned. "About this present time? Not pretending to show the past?"

"Yeah, they're all about Broadway. Wanna go?"

Dee smiled. "We shall go."

"Good. Six hours of movies should get my mind off my idiot of a mother. And the way you looked when I came in, you could use some cheering up, too."

The Russian girl stared solemnly out the window at the icy street below. "Yes. I have been thinking of my home."

Maureen sat down by her friend, patted her shoulder. "Sounds like we both could do with some entertainment. I'll freshen up, then we'll walk over to the Windsor."

Dee thoroughly enjoyed the Berkeley films. Every time Maureen glanced at her roommate, Dee's eyes were riveted to the screen, watching the dancers go through their paces. Afterwards, they discussed the pictures in their room, sharing mugs of hot buttered rum. "I wish Ma would see those films. I mean, sometimes they're a little corny, but they give a good idea of how hard we work in the theatre. But Ma doesn't like movies either, so she'd never go."

"The angles from which the director filmed were very unusual," Dee *commented.*

"Yeah. Berkeley's a whiz. I sometimes wonder how I'd do in Hollywood. After all, Ruby Keeler and I are both Irish! Of course, being married to Jolson does give her a bit of an edge. Let's see—how'd that tap routine go in *42nd Street,* where she's on top of the taxi? Like this . . . "

Maureen slid her taps on and began tripping energetically across the floor, thankful that Gina rented the apartment below. Only another dancer could put up with tap shoes on the ceiling at eleven at night.

Dee stopped Maureen in the middle of a slide. "That is wrong. First you move thusly, then to the left, then here." She had not taken off her shoes so they thumped heavily, unlike the smooth click of Maureen's taps, but Dee had the moves down pat. Maureen remembered her thoughts the first time she saw the Russian girl's strong legs.

"You've lived here six weeks and you never told me you could dance! You're fabulous!"

Dee stopped abruptly. "You never asked. We did many such things in my homeland."

"Folk dances, I'm sure, but where'd you learn to tap? Hey . . . I got it. You've memorized the numbers from the film, the way you do with the song lyrics. Can you do *any* dance you've seen?" Maureen perched on the edge of her bed, awaiting the answer.

"I could try," was all Dee would admit, but Maureen knew better.

"OK—we saw Fred and Ginger in *Carefree* last week. Do you remember where they dance to 'Change Partners'? I love that number. Can you do it?"

Dee surveyed the room. "We require more space."

"No problem." Maureen began shoving furniture around. Dee did not offer to help, but sat with her eyes closed, the picture of absolute concentration. When the floor was clear, she stood and began the slow, hypnotic steps while Maureen hummed the tune. Dee glided effortlessly over the floor, twisting, twirling. It was perfectly done. The only thing it lacked was Astaire himself. When she finished, Dee squeezed into the armchair now wedged against the wall and retrieved her mug from the nightstand. "It's cold," she complained.

"And you're hot!" Maureen countered. "Ever thought about auditioning for a show? I bet I could get you placed as a backup for *Leave It To Me*. Mr. Spewack has been complaining about one of our backups for days, but with the actors' union and the stagehands' union fighting it out, backups have been hard to come by. This gal's a lush, poor thing, and if she ever had to go on to replace one of us regulars, she probably couldn't tell her right foot from her left. And Mrs. Spewack owes me a favor from way back. You're a natural, Dee, and to think you never let on!"

Her friend looked doubtful. "I am not sure, Maureen. I have other things I must do."

"Aw, give it a whirl. This is *Broadway* we're talking about! Not many have the right talent. I oughta know! You're always saying you enjoy musicals, so why not be in one? Quit that crummy job at Big Al's! And don't tell me it won't fit in with your college work when the term begins, because you got plenty on top. It wouldn't be any trouble for a smart cookie like you to handle books and a show. Whaddaya say?"

Dee sipped her now-cold drink. "Well, it would be enlightening. I am sure not many of my people have even engaged in this kind of study."

Maureen shook her head. "Naw, you're wrong there. There's plenty of Russian types in the theatre. Why, Mr. Spewack was born in Russia himself. I bet you'll wow him if you talk his lingo."

The Spewacks agreed to give Dee a try-out. Dee had seen the show from the wings the week after she moved in with Maureen, and her incredible memory paid off. The gruff playwright and director was charmed by the Russian girl and thrilled to have a reliable back-up who already knew all the routines. Choreographer Robert Alton accepted her instantly.

Dee fit in well with the cast, having met many of them before. The one spot of trouble came when the wardrobe mistress was sizing her for costumes.

"Ya can't wear that bauble, dearie," the grizzled hag mumbled through a mouthful of pins. "It don't match yer costume."

Dee looked alarmed. "I am afraid it will not come off. I wear it all my life."

Maureen stepped in. "Look, Dee, stuff it down into your bra, then it won't show. It'll be OK if she wears one of the dresses with a high collar, won't it?"

The mistress frowned, a downward crescent of silver outlining her mouth. "I guess so. Mr. Spewack just said to outfit her. Personally, I think she'd look better in that black affair . . . Listen, honey, we can hide it this time, but if you wanna move on in this biz, you'd better think about taking it off."

Dee shook her head in that slow, almost sideways manner. "This will be the first and only time." Her voice was firm.

Maureen nudged her in the ribs, laughing. "Ah, what do you know?"

Dee seemed to enjoy life backstage. She floated everywhere, talking with everyone, asking them about their lives and interests. She was quickly dubbed "Walter Winchell" by the cast, yet no one objected to her relentless curiosity; Dee's disarming ways won over even the stars of the show, William Gaxton and Sophie Tucker.

The male members of the cast took an especial liking to the pretty new chorine. Maureen and Gina teased Dee to no end, for she did not seem inclined to start a romance, even with the best-looking young dancers.

"Looka that, Dee," hissed Gina one night in the wings. "He's giving you the eye again!"

"Which one?" whispered Maureen. "Ooh, Gene! He's even better looking than Gorgeous Andy. Wish he'd turn that dreamy gaze on me!"

But Dee ignored her friends' comments. "I am not interested in Mr. Kelly, though I greatly admire his dancing."

"Your loss, toots!" said Maureen.

All the regulars performed without fail until midway through February, when a nasty flu pressed understudies into action. Mr. Spewack ordered the chorus subs to go on for that night's show. Maureen was thrilled for Dee; Dee herself took the momentous announcement in stride. Maureen wondered if anything could ruffle the girl's feathers.

The show began well that night. Maureen noted with pride how splendidly Dee danced in the ensemble number "Vite, Vite, Vite" at the opening of scene two. After the number, Dee was flushed with excitement, her face glowing with an intensity Maureen had never seen before. She poked her friend while they waited for their next turn. "Ain't this something else?"

Dee seemed distracted; it took a moment for Maureen's comment to register. "Yes. Yes. It's *wonderful!*"

Then they had to move on for their big dance number with Sophie Tucker, "I'm Taking the Steps to Russia." Maureen noted with dismay that Dee was grinning ear-to-ear; a dancer she may be, but not a very good actress. She looked much too happy for the role.

She cornered Dee in the wings while they were changing costumes. "Hey, dim the grin, Dee! I know how thrilling this is, but Mr. Spewack won't like you going out of character."

Dee grabbed Maureen by the arm. "I cannot explain it to you! It would be too much. But I will be saying good-bye to you very soon!"

"What?" Maureen snarled, but Dee had hurried past.

During the next number, Dee stood opposite Maureen, and it was easy for the veteran hoofer to keep an eye on the tyro. Dee's grin had diminished, but it seemed to Maureen that the hidden locket somehow glowed through Dee's bra and cream-colored taffeta. It looked almost like a tiny light bulb. Maureen prayed no one else noticed.

After the song, she fought her way through the chaos backstage to find Dee. It was not easy, for the girl had ducked into a corner. There were just a few moments before the "Comrade Alonzo" number marked the finale of act one.

Dee cut off whatever remarks Maureen was about to make. She pressed her head close to the Irish girl and whispered urgently. Confusion spread over Maureen's face. Dee kissed her, then scurried to take her place as the chorus trouped on stage.

Gina, who was on Maureen's left, witnessed the exchange. "What's going on? She can't take it? And what's with the dress? She got a lamp stuffed in there?"

"Tell you later," Maureen hissed back. Obviously, stage fright had addled Dee's brains. Thankfully, Dee stood on Maureen's right for this routine. Maureen vowed to cover whatever goofy trick her friend tried.

The number was building steam. Unfortunately, the shining locket continued to glow eerily from under Dee's dress. Even Mr. Spewack had noticed it, and was having fits in the wings. Dee continued her dance, right in step with the other chorines, but her hand slid up cautiously and withdrew the necklace. It sparkled brilliantly.

Dee looked straight at Maureen. "Good-bye, and thank you, my friend," she whispered over the singers. Then she sidestepped behind heavy-set actor Walter Armin, who was playing Stalin, and . . . vanished.

Maureen gaped, but only for an instant. A true pro, she moved to cover Dee's vacancy. Gina, whose eyes looked as though they were about to pop out of her head, followed, and the line evened up.

Apparently, few in the audience realized what had happened, or else they accepted it as part of the play. The curtain fell on the first act, to thunderous applause. Commotion erupted behind the red velvet.

Gina squeezed Maureen tightly. "What happened? What happened? What happened?"

Maureen looked around at the empty stage, where Dee once was and then wasn't. "I don't know." She shrugged. What was she going to tell Mr. Spewack?

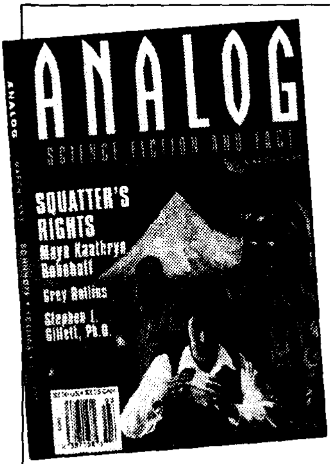
Gina pressed on. "Well, what did she say to you there, just before we went on?"

Maureen pursed her lips. "It didn't

make sense. She said this: 'Maureen, I can't explain this, but it's a little like in that film *42nd Street*: I'm going out there a youngster, but I've got to go back to a star!' "

The Italian dancer folded her arms and made an irritated noise. "But that's not how it goes."

"I know," said Maureen. "That bothers me even more than her disappearing. She *never* flubbed a line before." ■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(continued from page 251)

Revisit the world of Jack Womack's *Heathern,* where the drug-loot-based Dryden Corporation bought up everything in sight when the world's economies collapsed and came to dominate all human life with an iron hand. The time is some decades later, when Dryco is strenuously trying to "regood" itself and its world—rebuilding infrastructure, conditioning thugs to be less thuggish, sanitizing image—and that world is being swept by a schismatic religion whose deity (or deities) is (are) Elvis. Not surprisingly, Dryco is still heavily into control. It thinks that if it could just lift a fleshly Elvis from some parallel world and then control that one individual, it would have a handle beyond compare on all those masses out there.

Elvissey is the tale of what happens when. Dryco does indeed have a way to step into and out of at least one parallel Earth. It has a pair of missioneers, Isabel and her ex-thug husband, John. It has a specially equipped and retrofitted Hudson automobile for them to drive through the portal. It had a glimmer of an idea of what that other Earth is like—so racially bigotted that Isabel must take the drug Melaway to whiten her skin.

And away our heroes go, to find an Earth where the U.S. allied with Germany for World War II and thereafter asked advice on how to handle pesky minorities. A U.S. of smokestack forests and endless super-superhighways and snake-handling McCarthyites. Hell indeed, far worse than the Earth they left with all its faults, and now here's Elvis standing gun in hand over the bloody corpse of his Mama. Is this a god? Or a demon? Or a poor little lost boy whose yen for music finds no home at home and expresses itself in the raunchiest of lowdown blues. Whose lust grabs for Isabel and gets slapped down by a berserk dedeconditioned John. Whose mind gets quite thoroughly blown when he's yanked across the transworld portal to meet the Dryco apparat.

Can Elvis adapt? Can he become the god Dryco craves? What will the masses of crazed Elvis-worshippers say and do when they behold an Elvis in the flesh? (But please don't forget the sects that make an act of worship of disguise.)

If you think my prose gone madly lostcontrolled justabove, consider this the merest palest imitation Womackization, as visibles in linesbelow: "Caution essentials hereout till we're countrysided.... My couture unhauted... A map's essentialled... stared as if they were mentally denuding me."

When I reviewed *Heathern,* I said Womack's style detracted from the story. The problem is even worse now, and the result is something of a literary tragedy. I say this because if you can tolerate the style—the language he has devised to fit his future—long enough to discover the story Womack is telling, you will find a story worth reading, full of pathos and sentiment and character. Unfortunately, many people will find Womack's style, that language, so offputting as to keep them from reading more than two or three pages.

And that's too bad, for Womack has quite a keen wit that shows even in his title. Consider—There's an ancient legend of a musician who went to hell to retrieve his beloved and was promised success if he could resist the temptation to look back. Womack is retrieving the musician instead, but listen to the sounds of Eurydice and Elvissey and then, inspired, seek plot parallels and ye shall find.

Gordon R. Dickson's dragons are not quite the same as those considered in the next item in this column, but there's enough consistency to permit us to believe that fantasy and fact have something in common, if only because our fantasts are not making up what they tell us but peeking in upon some alternate world with all the internal consistency of a valid reality. Or maybe that apparent consistency is no more than the natural result of an endless exchange of crib notes.

Whatever. The interbook consistency is a matter of anatomy as much as anything. The differences involve magic and the strange ability of one Jim Eckert, who acquired his alias of the Baron de Bois de Malencontri et Riveroak when he moved into a parallel Earth roughly equivalent to our past fourteenth century, to turn himself into a dragon. He's also a magician, and his life is therefore complicated by the duties he owes to three different hierarchies. As a human, he owes fealty to the King of England and must go to battle when called. As a magician, he is apprentice to the mage Carolinus. As a dragon, he must fight when that kind is threatened by such things as sea serpents after their hoards.

Some of this we have seen in previous books of Dickson's series, beginning with *The Dragon and the George* and continuing through *The Dragon Knight* and *The Dragon on the Border*. Now we have **The Dragon at War,** which begins when Jim rescues Carolinus from a magical ailment and learns of a French plot to invade England with the aid of a horde of sea serpents. He meets Rrrnlf, a giant Sea Demon, who is furious at the sea serpent who stole his Lady, a beloved ship figurehead. He and his cronies go to France to interrogate the King of France and his wicked sorceror. They learn everything but the name of the mastermind behind it all, and then they must fight off the sea serpents even though Carolinus remains too out of sorts to be much help. Jim's multiple loyalties are recognized but the problems they could pose remain only potential.

It's not a subtle or complicated tale, and there's a tendency to pull rabbits out of hats just in time to save the soufflé, but it's a fun read. Or perhaps I should say it's *still* a fun read, and I hope that Dickson does not commit Christopher Stasheff's fatal error by running the series too long.

Did you know that "The best information we have on the flight behavior of dragons comes from radar data of the U.S. military"? It's top secret, but it's the truth. "The first radar detections of migrating dragons caused considerable consternation and set off a SAC warning of an imminent attack by Soviet bombers... Radar blips indicated a group of objects moving at thirty miles per hour in close formation and flying at a height of 4500 feet...a fighter pilot who caught a glimpse of one said that it looked like a 'giant bat.'... As a result of the Freedom of Information Act, radar data on the flight behavior of dragons have been obtained from the Air Force files..."

Would I lie to you? Would Paul Johnsgard, zoologist at the University of Nebraska-Lincoln, and his mathematician daughter Karin? Never doubt them, nor their **Dragons and Unicorns: A Natural History,** first published in 1982 and now available as a trade paperback.

Protodraco, the evolutionary ancestor of modern dragons, can be found in paleontology handbooks immediately after the entry on Piltdown man. The ancestral unicorn, *Plioceros,* is on the same page. But the Johnsgards mention these primitive forms only in passing. Their focus is firmly on the modern forms of both creatures, their struggle to survive in a world increasingly dominated by human beings, their current status as rare and endangered species, and the prospects for their survival if only we can set off suitable tracts of wilderness as no-hunting preserves. Unfortunately, the Society for the Preservation of Dragons and Related Creatures "is currently under CIA investigation as a possible subversive threat to the U.S."

I found this book a fascinating example of world-building. The authors demonstrate the academic mind at play as they construct anatomies, evolutionary backgrounds, and ecologies. The bits and pieces are fitted carefully together to make as much sense as possible, and the process—as the above excerpts indicate—permits a happy amount of satire.

Buy it. You'll love it.

You have to call Harry Harrison one of the Grand Old Men of science fiction. He has been writing for a long time—indeed, I cut my SF teeth on his *Deathworld* back when it was serialized in these pages—and he has been responsible for some memorable stories, at least one of which (*Make Room, Make Room*) became a movie ("Soylent Green"). He hasn't quit yet, either. The *Eden* trilogy is still of recent memory, and he can still produce a new Stainless Steel Rat yarn, as he shows in his collection, **Stainless Steel Visions** (illustrated by Bryn Barnard).

The introduction provides a brief summary of a career—writer, editor, comics illustrator—that stressed the importance of narrative hooks, fast paces, and neat closures, the traditional features of pulp fiction. Not surprisingly, many of Harrison's stories smell a bit musty. The surprise comes in when one realizes how much he has been able to say within the traditional constraints. For instance, "Roommates" is a very nice portrayal of cramped living conditions in a crowded world, where life is only as bearable as politeness makes it; it's a spin-off from the *Make*

Room novel. Other stories—"The Secret of Stonehenge" and "Portrait of the Artist" are pretty conventional gimmick stories, clever enough but much less memorable.

The new Stainless Steel Rat yarn? Picture Slippery Jim diGriz as an ancient codger sentenced to Terminal Penitentiary, last home for "all the antiquated criminal crocks of the galaxy." That's the scene that greets you when you open "The Golden Years of the Stainless Steel Rat." But all is not what it seems! Slippery Jim is as slippery as ever, and he's got plans, he does!

It's not one of Harrison's best-ever yarns. It's not even one of the best Stainless Steel Rat yarns. But it's fun.

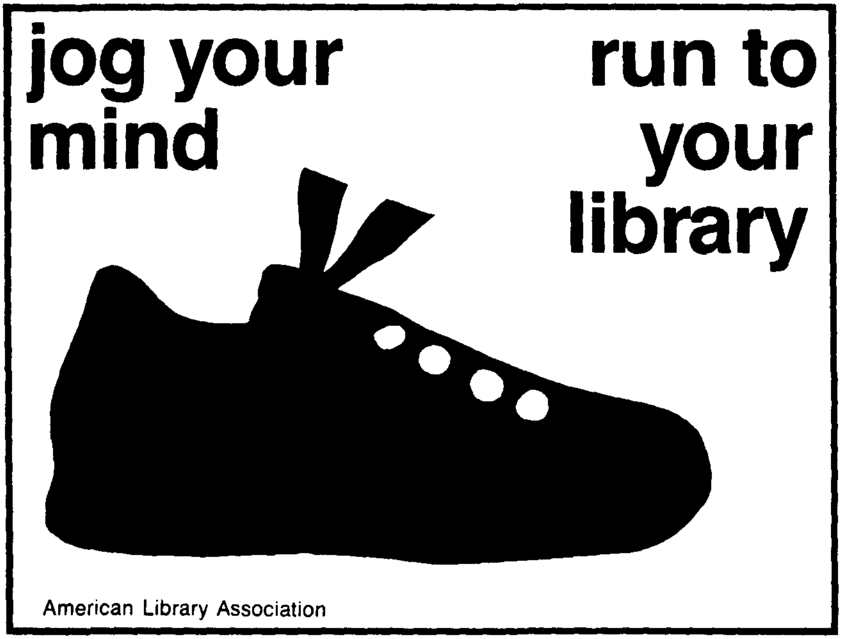
Maureen Caudill's **In Our Own Image: Building an Artificial Person** offers an overview of the technologies necessary to build an android or humanoid robot, their current states and their prospects for the not-too-distant future. Some of these technologies are subdivisions of that realm known as "artificial intelligence"—seeing or sensing, planning, remembering, analyzing and producing speech, problem solving. Some are more mechanical—the machinery of motion and motor control. Some have to do with the mechanics of information processing—digital computers and neural networks, with a good deal of emphasis on the latter, which seem able to figure out how to do things we don't ourselves understand.

The emphasis on neural networks should not surprise, for Caudill is a consultant in that field and has coauthored books on the subject. What I found much more disturbing was the implicit assumption that the proper objective of android or robot design should be the construction of an artificial "person," designed to have humanlike personality, memory failures and conversational abilities, among other things. This is not to say that I think that objective is wrong, or that discussing android/robot prospects in terms of such an objective is inappropriate. Certainly an "artificial human" is the sort of thing that will gain the attention of funding agencies and the public, and if we have the necessary technology we can do a great many other things with it. But it seems worth discussing whether human form and function are really the best suited for a device that—Caudill assures us—will very shortly surpass its creators. Failing to do so surely leaves one open both to the charge of anthropocentrism and to the possibility of missing important alternatives. (Just think—the designer of an orange-picking machine who thought only in terms of mechanical monkeys would never come up with a tree-shaking fruit-catcher; and it wasn't a pesticide company that invented the bug-vacuum.)

On the other hand, Caudill does avoid the charge of carbocentrism. In her penultimate chapter—perhaps her most interesting—she considers whether an intelligent machine should be considered alive. Her conclusion is that there is nothing sacred about carbon-based biochemistry. The key is function—responsiveness, energy-handling, even reproduction—and complexity, though she does seem willing to call even a computer virus alive, at least in the same sense as a biological virus is alive.

Caudill is exceedingly optimistic. The various necessary technologies, she says, are on the verge of usefulness. She almost succeeds in convincing the reader that shortly after the turn of the millennium we will actually have robot maids, nannies, and astronauts, and that then the business will really take off.

We have heard such claims before, and not just about robotics. But perhaps she's right. If she isn't, she still lays out a huge amount of fascinating information, meat for dreams and stories, especially in that old astounding vein. She also displays an awareness and a respect for SF, mentioning Simak's *City* and other tales and using Fredric Brown's classic "Answer" as her epilogue. ■



Michael A. Banks & Rick Adams

WHAT DO I DO IF I GET A PHONE CALL FROM MARS?

A GUIDE TO COPING WITH EVERYDAY ENCOUNTERS WITH ALIENS, PARALLEL WORLDS, TIME TRAVELERS, AND OTHER FUTURE SHOCKS

Science fiction has long been hailed as "the literature of the future," and has enjoyed no little success in predicting the future (witness Moon landings, the Space Shuttle, and the ever-popular Teflon). With the future arriving at an ever-increasing pace in the 1990s, we offer the following guide to handling the six science fictional situations you're most likely to encounter in the near future.

1. What do I do if I get a phone call from Mars?

Speak slowly and pronounce your words clearly. Keep your sentences short, and use simple words. Above all, do not shout—speaking loudly to Martians does not make them understand you; it just annoys them.

Try to determine whether you are speaking to someone in a leadership capacity, or to an ordinary citizen. If the former, ask the caller to hold on while you locate a competent government official (that could take a while, so make sure the call isn't collect!). If it's the latter, don't discuss religion or politics.

If the Martian doesn't speak English, hang up. You can't learn Martian over the phone, and if the Martian had something important to say to you, it would have taken the trouble to learn the language before calling.

Do not mention *War of the Worlds* to *any* Martian.

2. What if I receive a phone call from Jupiter?

Explain to the caller in a polite but firm manner that, being from Jupiter, it is not "life as we know it," and that you cannot talk with it.

Terminate the conversation as soon as possible; it will not profit you. If necessary, tell the caller that communication with unnatural lifeforms is a felony under Terran law (of course that's a lie, but Jovians have short memories).

3. What if a starship equipped with an FTL (faster-than-light) drive lands in my backyard?

First of all, do not bother to get your camera. The film will be fogged.

Second, be polite; anyone who has an FTL drive is easily capable of vaporizing rude humans.

Third, direct the pilot to the White House, the Kremlin, or the British or Canadian Parliament—whichever is nearest. They probably wanted to land at one of these locations, anyway. If in doubt, refer them to your local auto club for a Triptik.

4. What if I wake up in the middle of the night, and discover a gateway to an alternate world in my closet?

Don't go in. You almost certainly will be unable to return; that's the way these things work. And alternate worlds, while sometimes fun, are usually quite dangerous.

Remain calm and go back to bed. Check your closet in the morning. If the gateway is still there, nail the door shut.

5. What if I meet an older version of myself who has invented a time machine, and has come from the future to meet me?

Follow the books on this one. Ask about the stock market, the World Series, and the Triple Crown, and cash in. Don't take her or his advice on marriage, your career, or other personal matters; what you are going to do with your personal life is your business, and if you change things too much from your future self's perspective, you're liable to create a paradox.

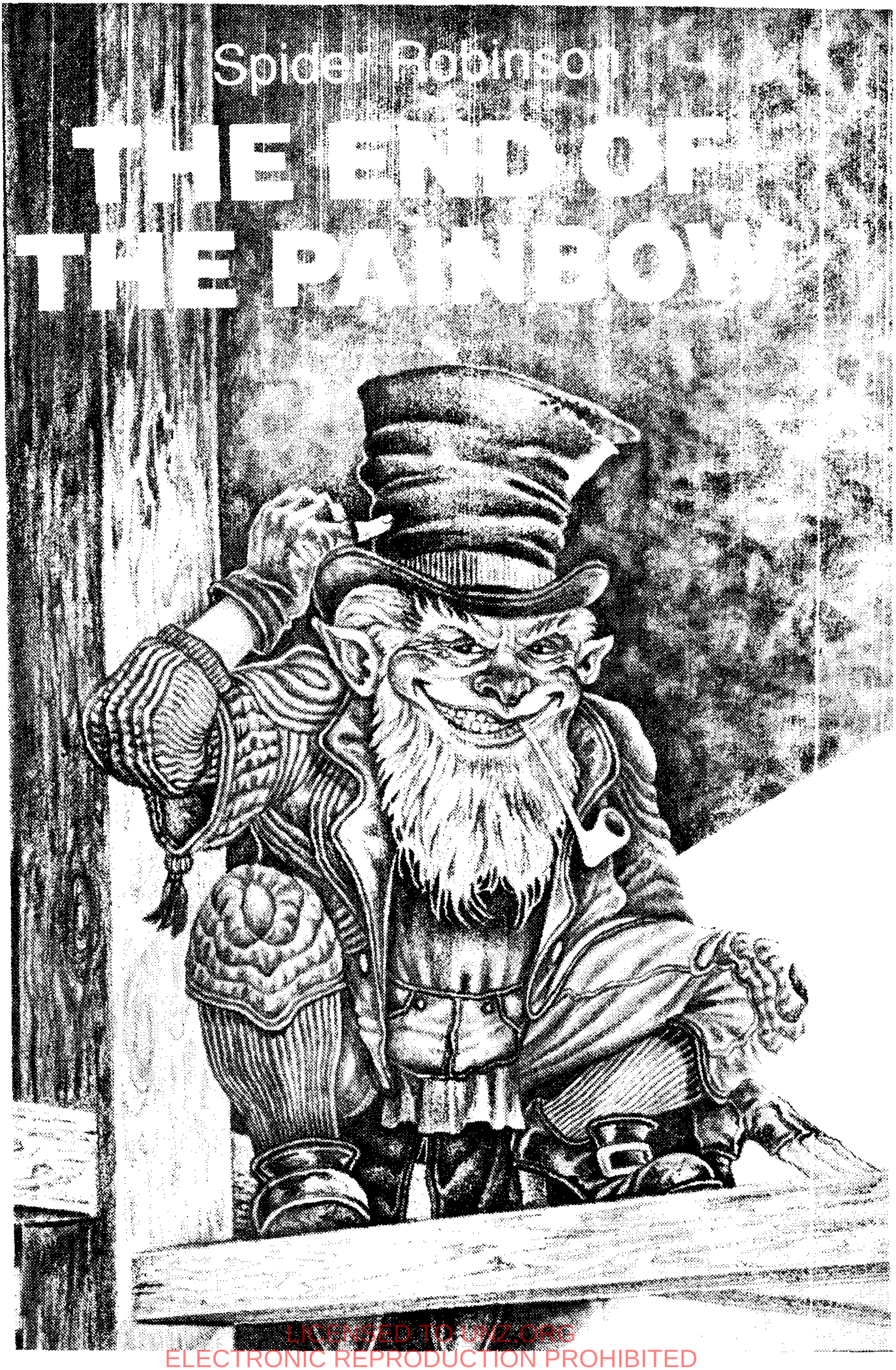
Speaking of paradoxes, don't forget to invent a time traveling machine and visit your younger self before you die. It will probably eat up all the money you will make on the stock market, but—what the hell—you can't take it with you.

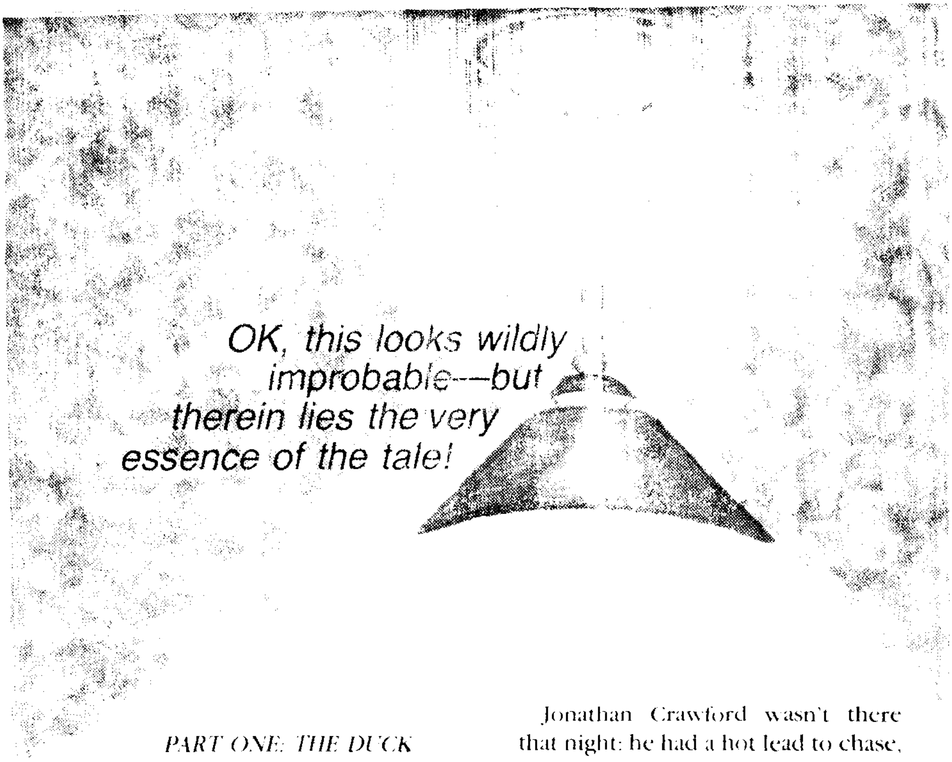
6. What if reality disappears?

We hope this one doesn't happen to you. There is not much you can do about it. It can be quite unpleasant.

7. What if civilization as we know it ceases to exist?

(In case you didn't notice, this happened twenty years ago; we mention it here only because so many people seem to have missed it.) ■


Spider Robinson
THE END OF THE RAINBOW



OK, this looks wildly improbable—but therein lies the very essence of the tale!

PART ONE: THE DUCK

It was our second night in Mary's Place, and things were going pretty good. The fire was crackling in the hearth. The Fount of All Blessings, our state-of-the-art coffee maker, was working well, making magic out of all natural ingredients. The booze flowed. More viscously, puns flowed.

Me, I had trouble in mind. But I had it so far down below the surface that not even my best friends caught me at it. We all had a problem, a big problem, and I was the only one who knew it. Since there was no solution to the problem, why bring everybody down?

And at least my bar was a pleasant place to be worried in. Good company in good spirits will get you through a lot. Fast Eddie at his piano was in rare form.

Jonathan Crawford wasn't there that night: he had a hot lead to chase, and would be too busy to drink for a while. Paradoxically, perhaps, now that we had proved to him that he might not be responsible for the existence of AIDS after all, he was more determined than ever to help stamp it out. There were about a dozen more people present than the previous evening—Ben and Barbara, Stan and Joyce, Tina and Victor, Jim and Joan, Herb, a few others—but except for our first newcomer, the Lucky Duck, all of them qualified as Immediate Family. That is, people who had been present in Mike Callahan's saloon the night it was converted to a rapidly expanding plasma. Folks in a position to tell you, from personal knowledge, what a nuclear firestorm is like up close.

People had been telling the Duck Callahan's Place stories all night—and either he believed every one of them, or the furry little bastard was damned if he'd give us the satisfaction of seeing how much he admired our skill as liars. I wondered which was true. From everything we'd learned about him the night before, extraordinary occurrences were utterly commonplace to him—but his pan was *so* dead, even beneath all that beard, that you had to wonder if it was costing him effort to keep it that way. Folks began to try to blow his mind, to come up with a true story that would exceed his credulity limit. Then at one point—just as Long-Drink McGonnigle had finished telling him about Dink Fogerty, who for a short time could make a dart board *want darts,* the Duck suddenly counterattacked.

"You find that unusual?" he said. "Strike you as bizarre, does it?" His tone was negligent, but his voice was loud enough to draw eyes. (Odd, that voice of his. You couldn't call it beautiful, exactly, with that honking quality to it, but it was certainly commanding, almost mesmerizing, when he wanted it to be.) "You citizens think you know about weird, is that right? Watch this, turkeys!" He slid from his chair, strolled with lazy grace through the crowd to the television set, punched it on, and returned to the bar.

Those of us who could not see the screen (most of us) were oddly wary of changing that status; as one, we looked to Fast Eddie, who could see the screen from his piano bench, for a report.

"Program crawl," he announced, puzzled.

We understood what he meant. We just didn't understand what *it* meant. All cable TV companies reserve one channel for an endlessly scrolling list of which programs are scheduled on what channels for the next hour and a half, in half-hour blocks. So what? Eddie squinted at the programs listed, found nothing to report for a few seconds . . . and then suddenly his eyes grew very wide and round.

"*HO*-ly . . . *shit,*" he said hoarsely, and checked his watch, and looked at the screen some more, and rubbed at his eyes with his hands, and so on until Long-Drink lost patience and snapped, "What the hell *is* it, Ed?"

"It's now," Eddie croaked. He looked appealingly at Long-Drink. "*Right* now. I mean, *now* just started . . . now."

Rooba rooba rooba, said the crowd.

We all understood Eddie perfectly. The program scrawl typically lists ninety minutes' worth of programming on forty-some channels, in half-hour increments—and an Iron Law of the Universe states that if you access the program scrawl 1,000 times at random, 871 times it will have just *finished* the present half-hour period, forcing you to wait the maximum possible amount of time for the information you seek. An additional 127 times, you'll be trying to find out what's going to start in the *next* half-hour slot, so *that* block will have just finished. The only thing more certain is that if you give up and spin the dial to *see* what's on, every single channel will be showing commercials. Everybody knows this, and for some reason nobody ever talks about it. (You don't want to tug too hard at an anomaly like that: your universe could unravel like a cheap sock.) You can set your watch by it; you can watch your set by it; it never fails—unless you're attempting to demonstrate the phenomenon to an unbeliever.

Until now. Either Eddie was lying, or the Duck had—right before our very eyes—accessed the program scrawl just as it began to display the current listings. The most consistent example of Finagle's Law in the universe lay in ruins.

"Jesus Christ and His Tympani Five," the Drink exclaimed.

And then things got *weirder*, real fast.

First, fire—

Wanting to dramatically express his astonishment, Long-Drink attempted a histrionic gesture: he clapped his hand to his bosom, like a silent-movie heroine, while rolling his eyes at the sky. (Being Irish, he already frequently rolled his r's.) His right palm chanced to reach his chest first. There it encountered a lump in his shirt pocket: the little plastic film can of strike-anywhere matches he likes to light on his thumbnail, and all too often on his fly. The container happened to be full to capacity. A split-second after his right palm struck it, his left palm slapped against his right hand. Perhaps some unlikely harmonic resonance occurred. The entire canister of matches went up, with more than enough force to blow off the lid and send a fiery column of flaring matchsticks high into the air, like munchkin fireworks. Well it was for the Drink that he had tilted his head back—the rising barrage missed his chin and sailed high in the air, spreading like a fountain of flame. Only *one* of the forty-odd burning matches fell back onto his head and set his hair on fire.

Which made it unanimous. There were forty-odd people in the room, kind of clustered near the bar, and not one of us had our hair set on fire by any more—or any less—than a single match. It looked for a second as if two matches were going to land on Tommy Janssen, but he made a wild attempt to bat them away and managed to knock one of them high over the TV set so Fast Eddie wouldn't be left out. The room began to fill with the smell of burning hair. And the sound of forty-odd reluctant Apostles, beginning to speak in tongues. . . .

Then, water—

Well, beer. Luckily we are all experienced drinkers: those who held stronger beverages had presence of mind enough not to use them. But the alcohol content of beer is low enough to permit its use as an emergency fire extinguisher. Lucky us! —there was precisely enough beer on the loose to just wet down every single head. Tom Hauptman and I got each other. Since Fast Eddie had a straight Bushmill's in his hand, three or four helpful souls sent their dregs his way; all four missed and soaked the TV, which sparked and died. Eddie, meanwhile, solved his own problem: it was not his hair but his cabby's cap that was burning; he tore it off and trampled it in the sawdust.

Then, ice—

—as we all turned as one, with beer trickling down our necks, to glare at the Duck.

He smiled. "Hell," he said contentedly, "you probably think *that* was weird."

Those holding drinks stronger than beer now reached a consensus that their time, too, had come. The Duck's range and bearing were taken; arms cocked—

Suddenly the Duck was on his feet, eyes flashing. "Would you guys like to *see* something *really* weird?"

Consensus changed; there were much more practical things to do with hard liquor. "Don't see why." "Not me." "No, thanks Duckster, maybe later, eh?" "Well, it was a hot night anyway." "I love a good beer shower."

And folks sort of went back about their business.

The Duck turned to me, indicated his empty glass and held up one finger. I drew him another Rickard's, and waved my hand over it to indicate that it was on the house. He nodded thanks, once. "To competition," he said softly, and tossed the empty glass negligently over his shoulder. "Maybe I can't outpun the big sawbones over there," he said, nodding toward Doc Webster, "but I can out-*weird* all of you rummies put together, any day that ends in y."

There was a distant "Ouch!" and then a small musical crash as the empty glass finally arrived, by circuitous means no doubt, in the fireplace.

"Mind if I ask a snoopy question or two?" I asked.

He shrugged. "Ask. If you stumble into any sensitive areas, I'll rip your eyelids off to clue you."

"You been this way from in front, Duck?"

His answer told me that he had caught the obscure Lord Buckley reference. "Why—you gonna straighten my bent frame?"

I shook my head. "Wouldn't know how. I just figured if it came on any time *after* you were born, where and when would be a clue."

"Astute. Naturally, such a thing would never have occurred to *me*. But as it happens, I have been the Lucky Duck ever since birth. Mom always said my father was the same way."

"You never knew your dad?"

"I tried, but his steadfast absence defeated me. That and Mom's reticence. About all I know about him is that he had red hair, his first name was Eric, and he must have been a tough guy—she never called him anything but Feared Eric, and she doesn't like to talk about him." He belched spectacularly. "I'm just guessing the red hair because she's Irish—for all I know he was a Apache. Or a Martian."

I made a long arm and punched myself up a Blessing from the Fount. The thirty seconds or so necessary for the beans to be microwave-roasted, ground, and brewed gave me time to think. Difficult to try and help such a thorny little guy. Did he even want any help? My Irish coffee was ready; I took the mug from the conveyor belt as it emerged from the Fount. How would Mike Callahan have handled this?

Well, kindly, above all.

"Gotta be a strain on a guy," I said tentatively, taking that glorious first sip.

He shrugged.

"Suppose I *could* straighten that metaphorical bent frame," I said. "Hypothetically . . . would you want me to?"

"Make me a normal human being? Would *you* want to be one?"

"I'm serious."

"Doubtless many would agree with you," he said acidly, and then relented. "Oh, all right. I admit it's a good question. But how would I know? I have nothing to compare my life to." He shook his head. "I don't know, sometimes I think life would be a lot simpler if odds *didn't* get even odder around me. The only thing I can say for it—and against it—is that the luck is never totally good or totally bad. Just weird. Sometimes I think I've got a guardian idiot."

I cracked up. "You too? I've had that feeling all my life. I never heard anybody else call it that. A guardian idiot: a little invisible spirit just behind my shoulder, looking out for me . . . only he's an imbecile."

The Duck nodded. "But a lucky imbecile. Somehow the net effect is usually that things more or less cancel out. Like, if you're sitting next to me and you win a million bucks in the lottery, don't worry about it: something will happen and you'll be right back where you started before you know it. Except for any wear and tear it might put on your nerves to win a million dollars and lose it in the same day."

It must have been hard for him to keep a friend. No wonder he was so sour. He always lived in interesting times.

"No," the hairy little man said, "taking it all in all, I don't think I'd want to *lose* my . . . whatever it is I've got. I mean, obviously my life is perfect: it produced *me*. But like I said last night, if I ever meet that Mike Callahan of yours, I'd sure like to ask him whether or not there's some way to put an off-switch on the bastard. Or even just a rheostat. That's why I plan to hang out here awhile. As I age, I weary of being fantastic *all* the time. Just about the only thing I've never tried is boredom. People seem to work so hard to get it, I figure it must be worth trying."

"I enjoy having you in my place, Ernie," I said, thankful that I remembered at least half of the birth-name he'd given us last night. "I got a feeling you belong here. And we could sure use you: luck is what this place needs in spades. But in all honesty, I wouldn't hold my breath waiting for Mike to show up."

He grimaced. "Christ, that's a break. I was bracing myself to do mouth-to-mouth on you if you tried it. Look, you just opened this joint. I'll give it a week or two; maybe this Callahan will show up. If not—" He shrugged. "There are worse places to have a beer." He finished his glass, and tossed it negligently over his shoulder. Behind him musical pandemonium broke out, thuds and crashes and cries of dismay, and people lurching back and forth. I don't think I could tell you any more about it if I'd seen it happen. All I know is, as the commotion was ending, the Duck stuck out both his hands, and his empty glass—two-thirds full now—dropped into them from above like a mortar round. He caught it well: some beer escaped, but it impacted squarely on the bar-rag that lay curled up before me.

He took a sip. "Half Dos Equis and half Cooper's," he announced.

Behind him there was brief silence . . . and then sustained applause. "Damndest thing I ever—" "—and I tried to . . . just as you—" "—have believed it if I hadn't seen it with my—" "—and then it just—" "—goddamn work of *art!*"

The Duck turned around and acknowledged their applause with an inclination of the head.

"See what I mean?" he said to me. "Some places that'll get you assaulted. These guys appreciate beauty. A round for the house, barkeep."

The applause redoubled.

I helped Tom Hauptman pass out fresh drinks until he had it under control, then went back to the Duck again.

"Anything in particular seem to trigger it?" I asked him.

He shrugged. "Sometimes when I'm nervous. Out of sorts, like."

"Threatened? A defense mechanism?"

"Maybe." He didn't seem crazy about the implication. The true macho man doesn't *need* defense mechanisms.

No wonder he'd concentrated so hard on developing his *offense* mechanisms.

I decided the thing to do with the Lucky Duck was to simply accept him as he was and not worry about it. That was what Mike Callahan would have done. "Will you excuse me for a minute, Duck? I just remembered something I meant to ask the gang last night, and forgot. It's kind of important."

"What, end this riveting discussion? I'll have to kill myself."

Fast Eddie was just hem-stitching the final chorus of "In The Evenin' When The Sun Goes Down," to enthusiastic applause. I came around the bar and went to the chalk line. I took my mug with me, and whistled for attention. I had a question for this particular subset of humanity, one that could not be asked with strangers present. So I had to bring it up now. Sooner or later, strangers would be walking in the door and it would be too late.

"Ladies and gents," I said, "It's time to define our mandate."

"Mandate?" the Drink said. "What's mandatory around here, except having fun and makin' toasts?"

"Precisely my question," I said.

"How do you mean that, Jake?" Doc Webster asked. "You feel a need to make some new rules?"

"Not exactly," I said. "I just want a clear statement of what it is we're all here for."

"*Drinking*," Long-Drink said, as one explaining the obvious to a child.

"Being merry," Eddie said in the same manner as Long-Drink.

"Sharing," Maureen said.

"Those are good things to do," I agreed, "and if that's what we all say we're here for, well, we could do a lot worse. But everyone in this room—except you, Duck—was within earshot the night I first proposed opening this joint and agreed to run it. Anybody here remember why? Anybody recall what we *said* it was gonna be for, that night?"

Light was dawning all around.

"*We were one that night.* I know a lot of time has passed since—I don't know about you, but I remember it real good. For a few minutes there we were one, in telepathic communion, and not for the first time, either. So when it was over we hurt. That's why everybody hurts—because they're not telepathic. And it's a lot worse when you know what you're missing. So we all decided that if we could do it twice with the help of Callahan and the McDonald brothers, maybe in twenty years or so of trying we could learn to do it for ourselves. We *knew* the potential was there. And we agreed it was worth trying. This place was going to be a kind of casual workshop, a seminar in getting telepathic."

Thoughtful silence.

"We've all kind of drifted apart some in the last year or two," I said. "Nobody's fault; none of us had a home big enough to hold all of us, that's all. Now we do. Have we drifted so far away from that night in the woods that we no longer want to try and get telepathic again? Are we content at this point to simply drink and be merry and share? Me, I'll go either way; whatever we decide. Take your time."

Long thoughtful silence.

"Do you have any specific ideas on how to go about getting telepathic, Jake?" Tom Hauptman asked.

"Just the plan I suggested that night," I said. "Love each other as hard as we can, and see what happens. And in the meantime, drink and be merry and share, to pass the time. Stick with what's worked for us in the past, in other words. I haven't got any Six-Step Program; I don't want to turn the place into a séance or an encounter session. I just want to know if it's all going somewhere . . . or if it's all right here."

The Duck was so interested he forgot to look bored. He signaled Tom Hauptman for a new drink.

"I remember that night," Long-Drink McGonnigle said softly.

"I've never forgotten that night," Isham Latimer murmured, and hugged his wife Tanya to his side.

"I'll remember zat night in my grafe," Ralph von Wau Wau said.

"Like you said that night, Jake," Noah said, "maybe it'll take us twenty years to figure out how to do that again, but I got twenty years I'm not using." A couple of people nodded.

"Being all together like that," Doc Webster rumbled, "being *whole* for once. . . ." He shook his big head. "Let me put it this way: I found a nuclear explosion at arm's length to be a less interesting experience. No: I found *surviving* a nuclear explosion at arm's length less interesting. I don't know about the rest of you monkeys, but . . . no, that's the point: I *do* know about the rest of you monkeys. That's what we're all here for, all right."

And he spun on his heel, as gracefully as someone who weighed less than four hundred pounds, bellowed, "*To us!*" and fired the first shot of what became a thundering cannonade of glasses and coffee mugs into the fireplace. The cheer was as loud as the explosion.

I emptied my own mug quickly. I was smiling as I lobbed it. Not one of my clientele had needed to be told that this once, for this toast, I didn't mind them throwing mugs as well as glasses—that it was more important that every one of us be in on the toast. Maybe the task we had set ourselves *would* take us twenty years, but we had already made a start.

Then I thought of something. Sure enough, there was one customer in the whole house who still had a drink in his hand.

"Hey Duck," I called, just loudly enough to be heard over the general celebration. At once it dropped several decibels.

The Duck fixed an insouciant eye on me. "Yah."

"You in?"

He looked slowly around the room, meeting pair after pair of eyes. Then he looked down into his drink—a shot glass of Cherry Heering: who else would order such a thing after drinking beer?—for a minute, and returned that direct, piercing gaze of his to me. "Let me get back to you," he said.

I nodded. I knew the little flash of irritation I felt was unreasonable—but I felt it nonetheless. "No hurry."

He caught me at it. "I know. How could anyone turn down an offer to get married to several dozen people he'd only met the night before? The ungrateful rat."

I started to protest that I wasn't annoyed at all—and swallowed the words. Why would anyone want to get telepathic with a liar? "You're right," I said. "It was stupid to ask, if I wasn't prepared to hear an honest answer. *I* think we're a pretty special bunch of human beings—but I've known us for years, been through a lot with us."

"And since you *know* how terrific you all are," he said, "you have no doubt in your mind that before long, either I will realize that, or I'm so much of a jerk you wouldn't want me around anyway. So we have no problem."

I had to grin. "Nope. I guess we don't."

"The heck we don't," Tom Hauptman said in genuine alarm from farther down the bar. "We're out of beer."

Rooba rooba rooba. Consternation and astonishment competed for dominance. I went with denial. "Bullshit," I cried, and turned to look.

Tom was holding down all six draft taps. Not a drop was flowing. "Tap city," he said hollowly.

I forgave him; he was under stress. "How is that *possible*—?" I began, and cut myself off when I heard my voice come out sounding like a Pekingese in a snit. I tried again. "There is no way in hell this many people could have drunk six barrels dry in a night and a half. Not even *these* people." This time my voice was better, more like a beagle in a snit.

Could that thief of a distributor have sold me kegs that weren't full? No, I'd hauled them in the door myself, and my lower back was certain they'd been full then. A leak that massive would have left the place smelling like a brewery. "Well, there's only one sensible thing to do," I said. "Have a drink. Reverend, fix me a cup of Geb, will you?—and double up on the Black Bush."

"Sure thing, Jake," Tom said. He went to the Fount, and shortly handed me a mug of Geb Keyserlingck's magic coffee from Daintree, Oz. I took a deep gulp, and nearly choked. "Jesus, Tom, you forgot the whiskey!"

"The hell you say," the ex-minister said, shocked enough to use profanity. Our eyes met. "Oh my gollygosh," he said slowly.

He unlocked the front panel of the Fount of All Blessings and swung it open. Sure enough, the Bushmill's bottle inside was empty. As we stared, the little red pilot light on the panel that warned of that very condition lighted for the first time. I looked to the row of replacement bottles beside the machine, and was only slightly startled to find them empty as well. So was every bottle on the shelf above the cash register.

I glanced around. Not *every* glass and container in the room was empty. Just the ones with alcohol in them.

Rooba rooba ROOBA ROOBA—

"AARGH!" the Duck exclaimed, and yanked both hands away from his shot glass. It hung in midair, like Wile E. Coyote ten feet past the edge of the cliff, for long enough that I could see the tumbler was bone-dry, somehow emptied *while he'd held it in his hands;* then it fell, hit his foot, skittered across the floor at high speed, rolled up Merry Moore's leg and under her skirt, and committed a mischief upon her. She made the same sound the Duck had, in a higher octave, and . . . expelled the glass, somehow. It bounced high off the floor, once, and as it descended the Duck tugged his waistbands an inch or two away from his belly with an air of weary resignation. *Thop.* The shotglass landed squarely in his basket. He flinched slightly, and let go of his various pants. *Snap.* "Should have known better," he said sourly. "My own fault."

Silence, as glutinous as old peanut butter. . . .

"There's a few more cases of juice outside in the van," Tom Hauptman suggested.

"If it's still there," I said, "it's going to stay there until I figure out what happened to the last load. Booze costs money; I can't go pissing it away." Nobody reacted to the lame joke. "Duck, could all this be something to do with you?"

"Possible," he admitted, "but I can't figure out the mechanism. Something on the quantum level, perhaps. Maybe there's some uncertainty in the probabilities of how fast alcohol evaporates . . . no, it would have happened before now. I think. You'd better hope it *is* me: if it is, your hooch will probably be back shortly. But somehow I don't think so. This doesn't *feel* like me."

"What then?" Long-Drink said. "A plague of wino flies?"

"Whoever the son of a mother is," Doc Webster growled, "he's certainly struck right at the heart of this place. Or the liver, anyway."

"I was just about ta quench my toist," Eddie said darkly. "I been blowin' my ass off tanight."

"No booze, and all of a sudden I don't feel very goddamn merry," Tommy Janssen snarled. "All that leaves is sharing and trying to read the mind of the bastard that thought this up."

Trying to defuse the tension a little, Long-Drink McGonnigle put on his heavy Irish brogue. "If I get my hands on the spalpeen, the Dullahan will call at his door this night," he said.

"Mike's gone," Fast Eddie said.

"Not Callahan, Eddie: the Dullahan," the Drink said patiently. "Spelled D-u-b-h-l-a-c-h-a-n—'Dullahan.' Gaelic for 'dark sullen person'—but it doesn't mean you, it refers to the grim, headless lad who drives the Costa Bower, the Death Coach. It arrives at midnight as an omen that someone in the house will die shortly. I'm surprised at you, you've been hanging out in an Irish bar for years; you'd think by now you'd have learned a little something about *Jesus Christ*!"

Long-Drink and I stared at each other, thunderstruck. We had figured it out at the same instant.

"Well," Eddie said diffidently, "I *do* know a little somet'in' about *Him*. . . ."

I waved at him absently, too busy to explain. My nostrils flared, and I saw Drink's do likewise. The solution to the mystery of the disappearing booze was right over our noses. And it was bad news.

Long-Drink and I exchanged a meaningful glance. The very survival of Mary's Place was at stake. The Drink looked as worried as I felt. And at any moment someone else might twig, and blurt it out. If that happened, just about all the hopes I had left in my life were lost, maybe for good. I thought so hard I felt my scalp get warm.

Bingo! I had one effective on my tag roster who might just have the right combination of special talents. It was ironic that just about all those special talents would probably have struck most people as liabilities—right now, they were worth gold. Maybe literally. . . .

Tanya Latimer is visually challenged—or as she puts it, blind. (She says euphemisms are for the differently brained.) So I could safely assume both a better-than-average sense of smell, and experience in working without visual cues. Furthermore, she is an ex-cop, which is how she got blinded, which is another story, except that it wasn't her fault. So I could be reasonably sure that she would be both fairly handy in a crunch—at least a close-in kind of crunch—and fairly quick on the uptake. Also, she is black. That might prove to be of some help here, too.

The trick was to find a way to cue her. Fortunately, my late Uncle Al was a Gold Shield for NYPD.

"Sister Tee," I said, quietly, "hear me good, and chill. Ten-thirteen."

She rummaged casually in her purse for Kleenex with both hands, took some out with her left hand. "Tell it," she said softly.

"Don't name it, but you know the thing they do rocks and ice and boo and the legal in?"

"Yah." Honk! She took a deep breath through her nose, the way you do after you blow your nose, to check results. Most natural thing in the world.

"The legal at twelve o'clock . . . *he's wrong.*"

"I hear that." She balled up the Kleenex and fumbled for another with the hand that was still inside the purse. "What's my play?"

"Got your jewelry, by any chance?"

"I hadda go through Long Island to get here, didn't I?"

"Don't miss," I told her.

She smiled lazily. "When?"

I hummed the chorus of an old Charles Brown side, "I'll Tell You When."

She nodded, still smiling. Most of the gang were staring at us in puzzlement—but bless 'em, nobody demanded an explanation. Tanya's husband, Isham, who was getting maybe one word in three, understood that smile, at least, and began to be visibly alarmed. His wife's smile told him as plain as print that she planned to do something drastic to someone, soon, and he wasn't 100 percent sure that it wasn't him. He'd have paled if he'd been equipped for it.

Which meant there was no time to lose.

"Hey, *Naggeneen,*" I hollered, "your father was a Firbolg, and your mother was a fairy!"

A screech of rage came from the rafters above our heads. "*It's a damnable libel!* The man was an honest respectable cluricaune, just like meself!"

We all stared upward. Everyone but Long-Drink and Tanya and I was startled to see a withered little old man, three feet tall, perched in the crotch of a rafter. He wore a green coat with forked tails, a tall green cap in a state of sublime disrepair, a leather apron, pale green stockings, and glossy black high-heel shoes with silver buckles, nearly all of this obscured by a great cascade of snowy white beard which made his angry cheeks seem even redder. He was smoking a pipe like a white checkmark, and at the moment the bowl was glowing nearly as brightly as his bloodshot eyes. But redder than coat or cheeks or eyes or pipe-bowl, or all of them put together, was his lordly nose. He was toweringly drunk, shaking his fist at me with such force that he was near to toppling from his perch.

"Come on up beside me and say that, ya scut, if you're man enough!" he thundered. "Ya whey-faced ridiculous git of a nearsighted merrow and some kind of perverted eel, I'll use yer elongated spine for a homemade accordion! I'll put yez to bed with a mattock, I will! Well, what's it to be?"

Four or five seconds of extremely

total silence ensued. I used them trying to think of the best way to set things up for Tanya.

But it was Long-Drink who solved the problem. Actually, the solution suggested itself. The Drink and I both knew exactly what the reaction of the rest of the gang at Mary's Place to this apparition was going to be; we could both predict almost word for word what someone was going to say, any second now. So Long-Drink said it first.

"Oh, is *that* all it is? A leprechaun?"

The little old gent let out a shriek of inarticulate rage, thrust his pipe between his teeth, and leaped tipsily from his perch, aiming for Long-Drink's head.

Halfway there, in midair, with every eye on him, he disappeared—

—and Long-Drink began doing an imitation of the villain in the last act of an Invisible Man movie, snapping his head from side to side and fanning air—

"*Now*, Tanya," I said.

PART TWO: THE CLURICAUNE

But she was already in motion. Tanya's not awful fast, but she's got a whole lot of quick. She had her jewelry—two bracelets of a ferrous nature, joined by a small but sturdy chain—already in her left hand; as her right closed and held on empty air a foot from Long-Drink, she fumbled briefly and closed one of the cuffs around a column of equally empty air, only inches from the Drink's throat. She shifted her grip to that air, let go with her right hand, and grabbed some more air, on the other side of Long-Drink's neck. With a grunt of effort, she bent it away from him and around in an arc, into the embrace of the second cuff. *"Cushlamachree,"* the little old man's voice roared. Both cuffs promptly plunged toward the floor as if heavily weighted—and then rose skyward like a rocket, spraying sparks and smoke, lifting Tanya a few inches off the ground for a moment. She hung on like a summer cold, dangling from the apex of a V made of handcuff chain, her heels off the floor, a rain of Gaelic curses showering on her head.

As I yelled, "Get her!" Isham was moving. A little large for a heavyweight, he was short on quick but long on fast; he reached his wife in moments and added his weight to hers, while trying to climb up her and get a grip between her hands. Doc Webster arrived just then, freeing Ish to go up for the jumpshot. Between them they managed to wrestle the astonishingly lively pair of handcuffs back to about chest level—whereupon the little old bearded fellow reappeared within the iron bracelets, finished the obscenity he was in the middle of, and spat on the floor.

"Goddamn," Ish said, wiping his eye and looking the little man up and down, "he's so ugly his nails ain't got cuticles, honey."

She nodded. "Somehow I sensed it," she said.

The cluricaune snarled. "*Blind* as a bat, in the bargain, bedad! Jazus, yer lucky: ya don't know yer ugly, ya corpulent sow."

His anger had the massive dignity and rolling majesty that only the magnificently drunk can achieve. His voice was a little like the Duck's: you couldn't call it pretty, exactly, but it held your attention somehow. Somehow he kept that long-stem pipe clenched in his teeth as he talked, without losing any enunciation at all. From behind the bar, I could smell his breath. It smelled like every drop of alcohol I had thought I owned, earlier in the evening. The wonder was his pipe didn't set it alight.

"Damn, little fella," Isham said, too bemused to be angry at the slurs on his beloved, "who'd you *come* here with?"

"Nobody, yet," the munchkin menace snapped, "and bedad, by the looks of your wife here, it's sure to be some little while if it's left up to me! Bondage, is it, with the handcuffs and all? Small wonder you carry these plague-take-it things on your person, ya batface—that must be what got you a husband atall! Sure, for you to be callin' *me* ugly is just like the pot tellin' kettles they're Afro-American. Cease and unhand me, ya chocolate moose, or I'll raise up a spell that'll give yez the root canal every Thanksgivin' from now till you give up an' cut yer own throat!"

Then all at once, with the mercurial changeability of the magnificently smashed, he forgot he was angry at her. "You know," he said conversationally, "it's a long time indeed I been wonderin' why your own folk ever gave up so gorgeous a name as The Colored—I don't understand it, be dipped if I do. Now what in the name of old Cù Chullain's cummerbund ever possesed yez to call yerselves Black—when yer *not*, and the word stands for everythin' scary and evil there is? I traveled the world in me youth, and I noticed yez mocha, mahogany, chestnut and cocoa ... ochre and umber and amber and gold...." His eyes were literally twinkling, as if someone had focused a baby spot on them. "... Coffee with cream, coffee with milk, coffee with nothin' but Tullamore Dew ... amber and anatase, russet and chocolate ... both the siennas, the burnt and the raw, hazel and sepia, several more ... an' never a black man or woman I saw. Most perishin' colorful people on Earth, and 'black' is the word for the *absence* of color! Go cobble a new pair o' shoes from the hide of the darkest of darkies in Africa: see if they'll let yez be wearin' them shoes to a wake—by old Balor's bumbershoot, what made yez claim yez a name ya can't wear, even on the *outside?* The Black Irish, now: *there*'s a people that's *black*, have yez got any insights to share on the matter?" Whereupon he belched with shattering force, crossed his twinkling eyes, winked the one that was now facing Tanya ... then slowly winked the other as well, and passed out.

The silence was refreshing.

He remained in midair, on his back, breathing noisily. His elongated white pipe had slipped at last from his teeth, hovered below him, about a foot from the floor.

"Tanya, Ish, Doc," I barked, "hang on for dear life—he could be faking." The sense of relief was overwhelming.

"Voice on him like a model airplane," Doc Webster said, shaking his big head. "And yet somehow it'd be kinda pleasant to listen to—if there wasn't so much of it. So that's a leprechaun, huh, Jake? I forget what the deal is now: we're supposed to not take our eyes off him?"

"Don't be silly, Doc," Noah Gonzalez said. "It's the cuffs that'll hold him, if anything will."

"Is it true he knows where to find some Acapulco Gold?" Tommy Janssen asked excitedly. "The famous pot at the end of the rainbow?"

"Aw, rot at the end of the painbow—that's an old wives' tale," Shorty Steinitz said.

"What's wrong with old wives?" Maureen Hooker asked dangerously.

"Sorry, troops," I said hoarsely. I tried to clear my throat, but I didn't seem to have my E-meter. *Get thee behind me, Thetan*! "He's *not* a leprechaun. It's much worse than that. He's a *cluricaune*. Leprechauns make shoes."

Brief silence.

"What do cluricaunes do?" Doc Webster asked.

"Drink."

He paled. "Oh, shit."

"Hip-deep," I agreed.

"A cluricaune," Long-Drink said darkly, "is a walking thirst."

"A walkin' toist?" Fast Eddie exclaimed. "Cripes, Jake—"

"Take a good look, folks: that's the finish of Mary's place, right there in handcuffs," I told them all. "Unlike many of the Little Folk, a cluricaune will attach himself to a specific *place*, rather than to a family or clan. And what he *does* to that place is to drink it dry—no matter what God or man may do to stop him. A cluricaune can suck booze through a stone jug. He can smell sauce in a cesspool."

The cluricaune began to snore —loudly.

An extrapolation suddenly occurred to me. "In fact, I am the only bartender in the world prepared to bet cash that not one of his customers needs to pee."

Rooba rooba rooba—

"I thought I knew every con there was," Willard Hooker said, "but a cluricaune is a new one on me."

"What the hell is he doing in America?" Mary Kay asked.

"It's a good question," I conceded. "I've heard of a few of the old Daoine Sidh leaving Ireland—but mostly pookas, and once in a long while a Fir Darrig. It makes *least* sense for a cluricaune. Say you loved coffee more than life itself: would you move away from the foot of the Blue Mountains? It's highly improb—" I broke off and looked at the Duck.

"What's a Deeny Shee?" Eddie asked.

The Duck seemed to me horrorstruck by my obvious suspicion. Too late, I regretted having let it become obvious. "The Daoine Sidh are the fairy folk, Eddie," I said, "descendants of the Tuatha De Danaan, the Tribe of the Goddess Diana. Originally from Greece, by way of Scandinavia, took over Ireland from the Firbolgs back about the time clothes were being invented. They got their own butts kicked by the Miledhians about twenty-five hundred years ago.

The survivors talked it over and decided they couldn't live as a conquered people. So they went underground, at a place called Brugh na Boinne in County Meath, and over time evolved into the Daoine Sidh: the fairies and pookas and Fir Darrigs and leprechauns—yes, and the cluricaunes too."

The cluricaune's snore backfired twice, sharply, and then settled into the rhythm again—at a higher volume.

Doc Webster cleared his throat in counterpoint. "Look, Jake, in this company, I have had personal experience of many strange things. But I understood that the Daoine Sidh were *mythical.* Like ghosts, and channeled entities, and commercial kiddy porn. Not *real.*"

"You mean 'real,' like time machines, and faster-than-light travel, and people that rain won't fall on, Doc?"

"Unt talkink dogs?" Ralph von Wau Wau added.

The Doc didn't answer.

"Will it make you feel any better about it to call what he does 'PSI,' Doc? Like the way Fogerty could make the dart board want darts? Like what the Duck does? The cluricaune is here. Our booze is not. Ergo, a subrace of dwarves with paranormal powers must exist. You want to call it telekinesis, I won't stop you. Once you define 'magic' as 'knowledge I don't have yet,' you can stop being afraid of it."

"Well," the Doc said reluctantly, "when I'm holding it in my own hands, I can't very well deny it exists. But I must say this is aggravating. I was looking forward to getting *less* open-minded as I aged." He frowned. "All right: the Daoine Sidh are real. Just don't you say a goddamn word to me about Loch Ness!"

"My grandfather used to tell me stories about them," Long-Drink said. "Is that how you know about that stuff, Jake?"

"No, Drink—my people came over a century and a half ago. But awhile back I reached the age where a man starts to wonder about his roots."

"How'd ya know da guy's name wuz Noggin Ian?" Eddie asked.

The cluricaune opened one eye. "Me name is unknown to you yet, gallinaceous repugnant orangutang," he muttered. "Aye, 'Naggeneen' is what folks call a cluricaune, just a generical term for the breed: freely translated, it means 'a short beer.' Have yez got any here?"

"Not since you showed up, bocksucker," Eddie said bitterly.

The cluricaune went back to sleep. Noisily. His stupendous white beard floated above his torso, curling up slightly at the end.

"He'll never tell anyone his real name, Eddie," I said. "In magical terms, it'd be kind of like giving somebody your credit cards."

"Jesus, Jake," Doc Webster said, "skip the family history and nomenclature, will you? This is serious—what do we do about this joker? How do you decluricaune a bar?"

The bad news first. "The only thing you can usually do to get rid of a cluricaune is go on the wagon, and stay there so long that he gives up and goes looking for a better 'ole."

"How long does dat take?" Eddie asked.

"I've heard of up to fifty years," I said.

"Fifty years?" Margie Shorter groaned. "What's the *low* end?"

"I've heard of as little as a year," I said.

Rooba rooba—

"I don't tink I can wait dat long," the little piano man said, frowning deeply. "I gotta toist myself."

"You said 'the only thing you can *usually* do . . .' " the Doc said.

Now the good news. I smiled for the first time in what seemed like a long while. "Well, they say that once in a hundred years or so, and mind you, only if you happen to have a pure heart, an eye that sees no evil, a fleet foot, the grip of a lobsterman, and—" I glanced at the Duck "—the luck of the Devil himself . . . you *might* just be lucky enough to *capture* the cluricaune, in iron. Then you're in Fat City. It now appears that between us, we made the nut."

"So where's the trigger?" Noah asked. "Now that we have him located, secured and accessed, how do we disarm him?"

Noah used to be a bomb-disposal expert for the county heat, until there was a spot of unpleasantness over his taking a terrorist nuclear weapon he was working on home for personal use, and not bringing it back. Since no citizens or legal aliens had perished as a result (just a single alien, without papers . . . and a very nice tavern), no charges had been preferred—but he'd been transferred out of the Bomb Squad for good. He missed it fiercely, and still tended to think in those terms.

"Hear that, gang?" I said. "Noah has exactly the right mindset. Think of it like we're looking at a live, ticking—no, snoring bomb. Everything is going to be perfectly all right—*as long as we don't make any mistakes.*" I grinned. "The *good* news is, the snoring bomb is made of solid gold. If we handle this right, we can literally have just about Anything In The World We Want. I don't want to jinx it, but if we don't blow this, I think we truly may just have come to the End Of The Painbow—"

"I just wish—" Fast Eddie began.

"SSSHHHH!" Long-Drink and I said at once.

He looked offended. "I was just gonna say I w—"

"Shut up, Eddie!" we both bellowed, fear making us sound enraged. Fast Eddie blinked, opened his mouth to speak a third time . . . saw us draw breath to shriek at him, and subsided. "Jeezis Christ," he muttered, shaking his head. "Nice manners, you mugs."

Close call. "That's exactly what I was just getting to," I said quickly. "Once you capture a cluricaune, you get three wishes."

ROOBA ROOBA ROOBA!

"The first three wishes spoken aloud. . . ."

"Aw Jeez," Eddie said. He thought for a minute. "Sorry, Jake."

I sighed. "That's OK, Eddie. My fault, for trying to save the good news for last. Would everybody here please be *real* careful not to use the W-word at all for the next little while—just to be on the safe side?"

Nods all around. Doc Webster looked highly dubious . . . but kept quiet. (What are the limits on paranormal powers? How do you know?)

"I think it's time we gave this some careful thought," I said, and my voice trailed off. Within seconds, the gang's expressions mirrored my own rapidly evolving succession of emotions.

We were beginning to see how horrible our dilemma really was. . . .

MY PERSONAL FIRST-BALLOT
SHORTLIST:
(in no particular order, as they occurred to me,
beginning with number two)

World peace?

An end to hunger?

A solution for pollution?

The end of tyranny?

A cup of coffee that tastes as good as it smells?

Universal freedom?

A resurgence of urban folk music?

A truce between the sexes?

(I could not wish for Love, much as I wanted one in my life: what good is a love gained through magic trickery? But the passing thought suggested:)

An off-switch for the pain system?

A good high without addiction or backlash?

A cure for AIDS?

A cure for suffering, period?

A cure for death?

Oh, dear God: a retroactive *cure for death?*

Barb! Jess!
Mom!

* * *

Was there any chance at all of distilling that down to three wishes? Was there anything on that list you could forgive yourself for leaving out? Might you not also be tempted to give at least a little thought to wealth and fame—and a hundred other things? I felt like a mule surrounded by 360 separate piles of hay—each one concealing a bundle of sweating dynamite.

And there was still the very *first* wish I'd thought of. The one I had rejected so instantly I was almost able to convince myself I'd never wished to wish it. A simple, painless, gift-wrapped solution to the personal dilemma I'd been worrying about back at the beginning of the night, the one which had been haunting my dreams and churning my guts into brown butter for the past several months now. It was a small thing, next to world peace—but what isn't? I wanted to solve it myself, without assistance—but I wasn't sure I could, and I needed it solved so badly I was tempted beyond words to accept this free pass.

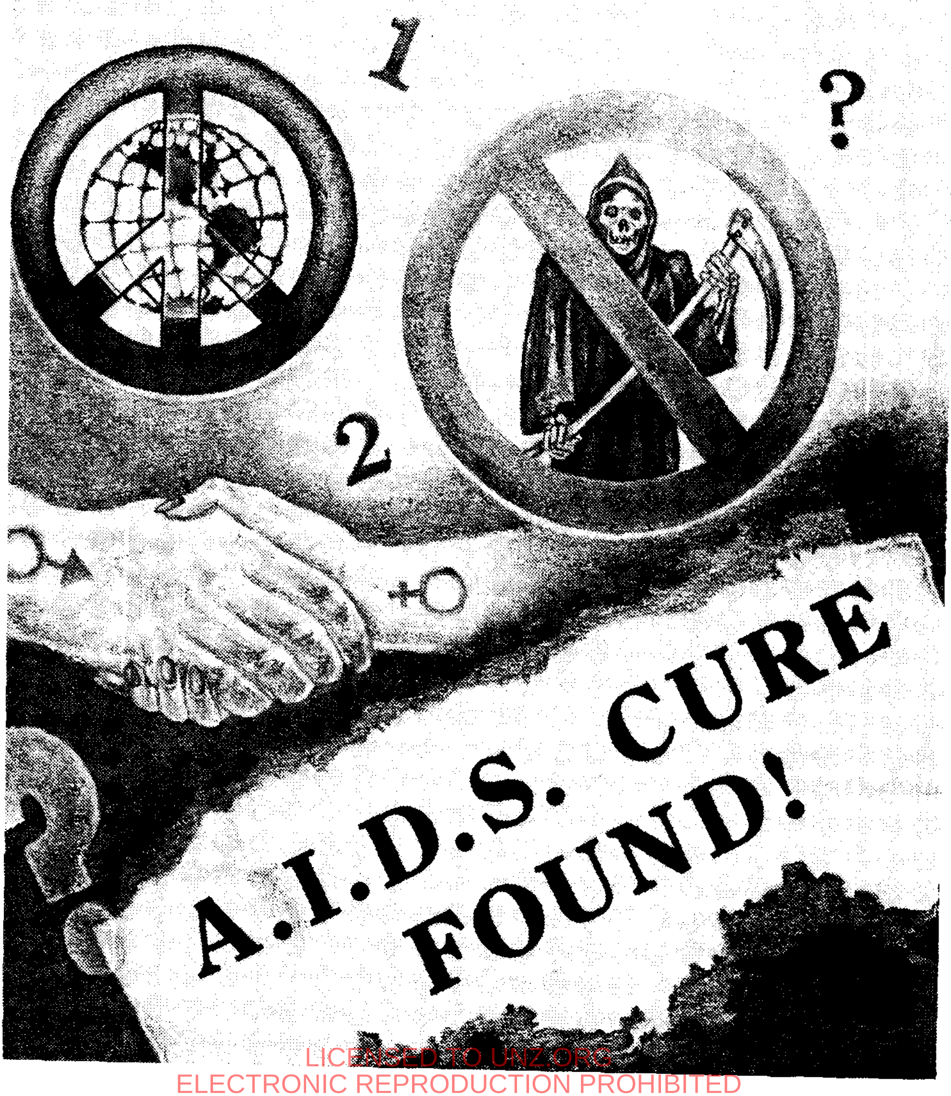
Looking around me, I could see that just about all of them had some similar personal demon of their own, someone it hurt unbearably to have lost, something they needed to live. And we all knew the arithmetic: several dozen into three doesn't go.

Honest to God, I think the dilemma would have destroyed a lesser group than us.

Had I loved those people an ounce less, I think I'd have said *screw 'em* and wished my dead ladies back to life before I could have a chance to think about it too much. Had any one of my customers loved me and each other an ounce less, they'd have tried to beat me to it.

I could spot ghastly boobytraps in every single one of those wishes that occurred to me in that first rush of thought—and there were bound to be mines I *couldn't* spot. Indeed, in every single story I'd ever heard, in every fantasy from every culture and clime, "wish" was a synonym for "booby-trap." That was the *point* of wish stories.

What good is world peace, if it comes at the cost of liberty? The simplest way to end hunger and pollution both is to exterminate the human race. Lose *too* much tyranny, and you lose order. I might not be able to bring myself to pour booze into cof-



fee that tasted as good as it smelled. Universal freedom denies my right to restrict Jeffrey Dahmer's recreational and dietary habits. If acoustic guitar ever came back, I'd be masochistically tempted to turn the bar over to Tom and go back on the road.

A truce between the sexes? *Are you out of your goddamn mind, Jake?* What else *is* there to distract us all from onrushing death? Television?

An off-switch for the pain system? Suppose you neglected to switch it back on? Have you ever been stupid enough to disable the little routine on a Macintosh that asks, "Are you *sure* you want to delete this file?" before letting you trash applications?

There *is* a good high without addiction or backlash, and with several medicinal benefits to boot. The only one

the government's brain-damaged "War On Drugs" has been even moderately successful in suppressing. (Its fatal flaw is, it smells nice.) Create another, they'd make that a crime too.

A cure for AIDS? Dr. Jonathan Crawford could have said a few things about that one. He'd been trying to cure malaria . . . and might just have *caused* AIDS as a side effect. He was now working on a cure for AIDS. But he was being very very very careful.

Death is reputedly a totally effective specific for suffering. And if living people did not suffer, would they be people?

A cure for death without the sudden universal wisdom and restraint to control birth would be a recipe for horror unimaginable. For that matter, so would a cure for death without a concurrent cure for aging. As Larry Niven said, old age is not for sissies.

I am not the man I was the day my wife and daughter died in that wreck—or the man I was the day my mother died in that hospital. If I could bring them back, uncorrupted and untraumatized, just as I remembered them . . . would they love this me? Would they know me at all? If they did, could my own heart take the stress of an emotional 180° like that?

Multiply my dilemma by—

—no, *raise it to the power of*—

—the number of people present with me in the room.

Now do you want to be telepathic, Jake, old buddy?

"Whaddya say we blow de tree wi—de tree tings quick on somet'in' harmless," Fast Eddie whispered, "before we get ourselves inta trouble, here?"

Long-Drink gently put a hand over Eddie's mouth. "What," he asked, "is *absolutely guaranteed* harmless?"

"Well," Doc Webster murmured, a timeless, silent time later, "it could be worse."

"How?" I asked mournfully.

"We could be down to *one*," the Doc explained. "This way we have a little room to breathe. Assuming there is anything to this business, which I frankly doubt. But if we screw up too bad the first time, we can always get ourselves out of trouble—or at least back where we started—and still have a backup wi . . . option."

"No backup option, Doc," Jordin corrected. "The third one is the most important one of all. Say you're right: we goof the first one, we undo it with the second, and there we are with a cluricaune in the house. The third is our last hope of ever getting rid of him."

"Sure," the Doc said, "ideally we hold Losing The Cluricaune in reserve for our third w—our third expressed desire, naturally. But if we . . . choose that one first, there's nobody to grant the other two."

"And you think there's any way in hell that you can get this many people—even *these* people—to agree on *one* choice?" I asked. "Without a fight? Are you ready for that fight, Doc?"

"Jake, it seems to me we have a responsibility—"

I reached an instant, unilateral and

irrevocable decision. If even Doc Webster, always one of the most sensible and wise and level-headed of us, was thinking along these sorts of lines, we were in big trouble. I knew he was wrong. He was being as reasonable and logical as any chump protagonist in a fantasy story; 100,000 stories said he was thinking like a victim. We had to break the mold somehow, move laterally.

But I was not sure I had the emotional weight to sway the gang from his way of thinking—and that made me a little frantic. Any one of them could doom us all, any second, with the best of intentions and a single sentence. Damn it, this was *my* bar! It was up to *me* to decide who had what responsibilities to whom in here. If any of us was going to bear the weight of this, it had to be me. So I made a choice that hadn't even gotten onto my preliminary ballot. To assert my authority—I yelped for higher authority.

"God," I said loudly, cutting the Doc off, "I wish Mike Callahan was here right now."

A great shout went up—

PART THREE: THE MICK OF TIME

My, didn't Mike look surprised when he materialized there in front of my bar?

I was a little startled, myself. The big mick was stark naked, and even more red-faced than usual. From these and other evidences, it was apparent that I had caught him in the midst of a tender . . . well, no, possibly more of a volcanic . . . moment with Lady Sally McGee, or some designated alternate. Even the cluricaune—who had roused from his stupor the instant I'd spoken my wish—opened his drunken eyes wide at the sight, and stared in uncharacteristic silence. Mike, of course shifted mental gears in something under a second.

"The saints preserve us with BHT," he boomed cheerfully, "I thought I'd seen the last of you mugs. *How in the name of God's gilded gonads did I get here?* Jake?"

My heart was hammering like mad. No, like glad. Just the sight of the Mick of Time was enough to make me feel that same fierce joy I'd felt last night, when my friends had come through my door for the first time in much too long. "Hi, Mike. It's not a short story. . . ."

He nodded easily. He had already . . . uh . . . regained his aplomb. "You know me," he said. "I got time."

Then there was a brief interruption. I was the first to lose it, vaulting over the bar, but I only led the pack by instants. I will simply say that not one of us felt the slightest hesitation or awkwardness in hugging a big naked Irishman . . . and if you find anything weird in that, I condemn you to live in that skull for the rest of your life.

Isham and Tanya kept guard, of course, but I think everyone else managed to slip into and out of that gang hug before it was through. We were all laughing and crying and considerably less worried than we had been.

All except me. As I stood back and let my friends have a chance to hug our mentor, I got in about ten seconds of happiness. And then I had a thought that made me literally bite my tongue. If I could wish Mike Callahan into my bar, *why couldn't I wish Mary Callahan-Finn into my bar, into my arms again?*

Barbara and Jessica had been gone for nearly two decades—my mother even longer. But Mary had only been lost to me for a period measurable in months.

Of course, she was married now. To a guy that blew up planets sometimes. A good friend of mine, besides.

(I winced, remembering something from my browse through Irish history—the Finn Cycle. Finn MacCool fell for Cormac's daughter Grainne, but she eloped with a member of his own band—much the way Mary dumped me for my pal *Mickey* Finn. The second-century Finn betrayed his friend and stole his beloved back, and ultimately died by treachery himself.)

Fast Eddie ducked outside to fetch a spare pair of work pants from Isham's truck (Ish being the only one whose pants would fit Callahan). Once he'd stepped into them, Mike spotted the stranger in the crowd, walked over and offered the Duck his hand. "Howdy, friend. I'm Mike."

"Hi," the Duck said. "I'm Ernie."

Callahan looked the hairy little guy over. "I like your comeek strip." He took the Duck's hand and shook it, and the Duck blinked at him in obvious bafflement.

"Mike," I said, "you and Ernie need to talk, later, but just now we got a small problem—"

"So I can see," he rumbled, gazing into the twinkling eyes of the cluricaune, and twinkling right back at him. "A cluricaune, sure as me mother was Irish! Good cess to you, Naggeneen!"

"Call me a blatherskite—Brian Boru!" the cluricaune cried tipsily. "Good evenin', yer Majesty, glad you could visit! And how are they keepin' in old Tir Na Nog?"

If there's anything Mike Callahan knows, it's how to humor a drunk. "Oh, merry as ever—not unlike yourself."

"Your Majesty, tell these Fomorians here to unchain me! I'm caught fair and square and I'll give me parole."

"What's in it for me if I do?" Callahan asked.

"A reasonable question." The cluricaune's pipe flew up from below him and found its place in his teeth. "I've got it, bejabers! I'll put my request in the form of a wager, and you be the judge if I win it or not. If I make every soul in this room drop their jaw—in a minute or less—and with two little questions—can I be restored to the use of me hands?"

With two questions? "This oughta be good, Mike," I said. "Some of us here didn't drop our jaws when he turned invisible."

The cluricaune cackled loudly. "It's not an illusion I offer yez here, t'is a fact—one you *know,* that's been sittin' right under yer face all yer life—you'll never believe that yez missed it yerselves!"

Mike looked to me. "Your bar, Jake."

A thrill went through me at those words. Like the first time my father ever said to me, "It's your house, son." I filed it for later basking.

"Well," I said slowly, "he knows where *my* buttons are located. Will he keep his parole? Obey us 'til our business is done?"

"I swear by me beard that I shall—an' a cluricaune's word is as good as his bond," the little man proclaimed.

"How good is his bond, Mike?" Fast Eddie asked.

"Good, Eddie," Callahan said. "As good as those bonds you got him in, anyway—and lots better than the ones they use on Wall Street. A little slipperier, maybe. You gotta be careful *what* word, what bond. But this seems pretty safe."

"Well, I do hate to keep a guest in irons if it's not absolutely necessary," I said. "Not that burning curiosity has any influence on my thinking. Go ahead," I told the cluricaune. *"Ét-onne-moi!"*

He contrived to bow in handcuffs. "Thank you, Your Worship. It's curious you should be speakin' in French, for the story I have for yez starts out in Cannes, the cinema festival place—oh, there's champion drinkin' there, almost as much as Oktoberfest, even a cluricaune can't make a dent in the liquor supply. So I go there one year, oh, a decade ago, and I find meself there in a tavern. And who should be sittin' across from me, sharin' a dram, but that big Orson Welles and that Mankiewicz feller, director and writer of *Citizen Kane*! I bought them a drink on it, told 'em how much I admired their movie—"

I had my eye on the clock. I intended, since Mike had said cluricaunes were literal-minded, to hold him to his one-minute deadline . . . and so far I didn't see him *near* a jaw-dropping punchline. So he'd met some celebrities, once. . . .

"—And said I'd a question I wanted to ask them, a question pertainin' to *Citizen Kane*. Well, Orson and Herman most graciously said they'd be happy to answer whatever I asked. So I sez to 'em, 'Right at the start o' yer movie Charles Foster Kane dies alone, am I right?' And Welles nods and Mankiewicz says, 'Quite alone.'"

One question down. I mentally checked my jaw. Still in place.

The cluricaune took inventory of the room with his sparkling eyes, with the same result, and then grinned broadly. He spoke slowly now, drawing it out for effect. "So I says to them, *'How in the world, then, does anyone* know *that his last word is 'Rosebud?'* "

Thunderstruck. That's the word I want. You like to think you belong to an intelligent species, and then something like this comes along. The film generally agreed to be the greatest ever made, certainly the most studied and analyzed movie of all time—had a hole in its plot you could drive a freight-train through, *in the first minute*. The entire premise of the film was logically impossible . . . and no one in all the world but the cluricaune had ever noticed it before. I didn't see one face that didn't have a dropped jaw.

The most amazing part is that there

are probably a dozen ways Welles and Mankiewicz could have solved their problem, without spoiling the solitude of Kane's death. It could have been fixed *after* the close of principal photography, with a voiceover. (Kane had just finished dictating his will into a wire recorder as— A freak echo in the heating pipes conveyed his voice to the attic, where a maid— A bug planted by his enemies—) But Mankiewicz and Welles simply never noticed the problem existed. Nor anyone else.

Mike Callahan broke the awed silence. "Turn him loose, Tanya—he's won the bet."

Tanya shook off her stasis, closed her mouth, and produced a key.

"Christ," Herb burst out, maddened beyond endurance, *"what did Welles and Mankiewicz say?"*

The cluricaune waited until Tanya had freed him, then lurched to his feet (two feet off the ground, mind) and said slyly, "What's in it for me if I tell yez?"

Callahan had to grin. "A reasonable question. Jake?"

I sighed. "Tom says there's a few more cases of stuff out in the van. You want to bring in a case of scotch, Tom?"

The cluricaune turned up his nose.

I sighed again. Well, it was worth it to hear the answer. "Make it a case of Tully."

He nodded acceptance.

When Tom came in the door with the case of Tullamore Drew, he nearly dropped it—for the instant he crossed the threshold, its weight diminished drastically. He appeared to try and fling it at the ceiling and changed his mind. The cluricaune's eyes began to glow like inspection ports in the wall of Hell.

"Welles looks at Mankiewicz, pale as a haddock," he said in a sing-song voice, "and Mankiewicz looks back at him in return . . . and together they puts down their drinks on the table, unfinished, and rises together and shows me their backs, and be damned if a word I could get from them after! Now dip me if that isn't excellent liquor—and Jasus, it's good to be shut o' the darbies—WHEE!"

Suddenly he was dancing a jig in midair, bounding high and recovering, drunk as a lord on the first of May. He kept missing steps and falling through his invisible floor, then swinging back up to try again, arms flailing wildly. People ducked out of his way. Glassware shattered. Ish stumbled into a table and demolished it. And then it got bad.

The cluricaune began to sing—

"When-a you swim inna da sea, an' a eel bites-a you knee, dat's a moray—"

There were howls of pain. The cluricaune laughed uproariously and kept reeling about like Zorba on acid, trailing peat fumes.

"—A New Zealander man with a permanent tan, that's a Maori—"

Jordin and Mary Kay Kare, who between them write really *good* parody songs, bellowed in protest and tried to bulldog the cluricaune together. Good thing they're married; they ended up on the floor in the missionary position.

"—when two patterns combine, in

a way serpentine, that's a moiré—"

Doc Webster was aghast. He was being outpunned, in his own lair, by a drunken fairy.

Pausing only to kiss his wife (a good man in a crunch), Jordin sprang to his feet and located my fire extinguisher. Mary Kay instantly leapt for cover. I opened my mouth in alarm—

"—He tells jokes, he's a ham; his last name's Amsterdam—dat's-a Morey!"

—and closed it again. Jordin's a physicist, whose specialty is laser-guided propulsion systems for spacecraft (the idea is, leave the engine at home, where it's convenient to work on), and he knows more than most about tracking moving objects. So I let him have his shot.

If the Defense Department had seen Jordin's performance that night, they'd never let him do any physics. He kept the stream from the fire extinguisher trained on the capering cluricaune, never losing him for more than an instant.

"—if yer vitamins be mostly C, D and E... take some more A—"

Jordin gave up when it became clear that the cluricaune's voluminous beard, twirling around him, could absorb as much as Jordin could deliver. The little man seemed to enjoy it.

Jordin's magnificent shooting was not completely without effect, however. It reminded the cluricaune of something. He lurched to a halt near the door, turned his back to us, fumbled briefly, and began urinating into the umbrella stand. Through his beard.

"—Oh, you lay 'What I Say' very gay—won't you play that some more, Ray?—"

A roar of general outrage was building to a cresendo. It was even *harder* to take without a drink for insulation. Sooner or later my patrons would remember that outside was the only place they were liable to *get* a drink tonight; once that happened an exodus would begin.

I was *not* going to let my bar be emptied on its second night by a dipsomaniac dwarf, with Mike Callahan looking on.

I reached under the bar, took out my Ted Williams Classic, and brought it down on the bar so hard the sound was like a rifle shot. Even the cluricaune was startled. He spun around.

People scattered out of his way.

I thundered at him. "You swore you'd obey me, you mannerless clown. Now put that away and shut up and sit down!"

To my surprise, it worked. Maybe the fact that it happened to come out as a rhymed couplet helped. Or maybe a cluricaune's word *is* as good as his bond. In any case, he ceased micturating, adjusted things behind that beard, and sat down on air without uttering another sound. The silence was deafening.

"Nicely done, Jake," Callahan said.

I warmed. "Thanks, Mike. You said he was careful about words. Uh... maybe you can guess the nature of our immediate problem?"

He nodded. "It's coming to me. He gave you three wishes, didn't he? And I'm one of 'em."

I winced. But of course it was not

the *noun* "wish" that was dangerous, only the verb. "You're the first. We started thinking about what to pick . . . and about the time we started to bite ourselves in the small of the back, I decided to ask your advice. I felt like I was . . . I *still* feel like I'm juggling old nitroglycerine."

"You are," he agreed. "Got a plan?"

"Excuse me, Jake," Isham said, brushing sawdust off himself and approaching the bar. "I don't mean to interrupt, but I want you to take this for that table I just totaled." He tried to put money on the bar.

I pushed it back. "Forget it, man. I can fix it."

He pushed the money toward me. "It's cracked down the middle."

I pushed his money away again. "Yeah, but I still think I—"

He shook his head. "No way do I want to be remembered like Big Beef McCaffrey." Big Beef once put a crack down the middle of the front door of Callahan's Place, with his head, on the way out—and for the next thirty-nine years, the story was still being told to newcomers. "I'm buying you a new table," he said, pushing the money toward me a third time.

"Isham," Tom Hauptman said, "at this point, there's no telling if we're still going to be *open* tomorrow night—"

"It doesn't matter," Tanya said. "Take the cash, Jake. I'll drag him here tomorrow night one way or another, and you can give him back the money when I show Ish that table repaired. I know you're a pretty good carpen—"

"AAAAARGH!"

* * *

Well, actually, five or six of us shouted different things, but the net effect was sort of an "AAAAARGH!"

The table was repaired. Without a crack.

"Naggeneen," I said to the cluricaune, "what are you trying to pull?" But I knew.

And he knew I knew. We all knew. "Plain as the nose on your face—and that's plain as can be—did I hear the young lady a moment ago," he cackled gleefully. "Shall we hear it again?" He put a finger up his nose, like the guy in the Monty Python sketch, and we all heard, with perfect fidelity, Tanya's voice say for a second time, ". . . I sho' wish that table repaired."

"Now wait a goddamn minute," Doc Webster said slowly. "I can accept the first wish. We know Mike travels through time without any hardware, so why can't a cluricaune know how to do it *for* him? But dammit, *this* one is just plain flat-out impossible."

Don't ever say that to a physicist. "Doc," Jordin Kare said gently, "all atoms are constantly in motion. It is a matter of overwhelming statistical probability that all the atoms in you will never happen to all move *in the same direction, all at once*, but to state that the odds against an event are a quintillion to one is to assert that the event is possible. You've seen the Lucky Duck play tricks with probability. And if you accept time-travel at all, then why can't a table move a few minutes backwards in time? How do you *know* entropy is irreversible?"

The Doc opened his mouth, and

shut it again.

"Aw shit, Jake, I'm sorry," Tanya said. "It just slipped out."

"Glad I could be of some service," the cluricaune said, and burst into gales of laughter, rocking back and forth in his tailor's seat. "Darlin', t'is pity ye don't keep yer brains in yer dumplin' shop—oh, I could have me a smack at your muns, ye enormous mavourneen! Two o' yer wishes is gone up in smoke. But one of 'em left—t'is a wonderful joke!"

There was a roar of outrage at this sophistry—but we had all known he took things literal-mindedly, had cautioned ourselves to be careful a dozen times: he had us dead to rights.

Suddenly, through the rooba-ing, came the startling sound of Noah Gonzalez laughing along with the cluricaune. Some of us glared at him.

"Sorry, gang," Noah said, trying to stop laughing and failing. "Just reminded me of one of my oldest nightmares. I'm working on a voice-activated bomb, and this cub reporter sneaks past all the uniforms, and fires a flashbulb over my shoulder and says: "That'll make a nice blow-up!" He lost it and folded over in his chair, hooting.

One by one, we all broke up.

Well, it was either that, or fall on the cluricaune with our hands and teeth, I guess. Maybe another barful of people would have chosen the latter. Some guys step on a rake in the dark, and get mad and go punch somebody. Others step on a rake in the dark, and fall down laughing at themselves. I know which kind of guy I'd rather be. So do my friends. Over the years, together, we had come to learn that if you get a chance to turn anger into laughter, that will be a good thing to do. I know I was glad the laughter gave me an excuse to put that silly baseball bat back underneath the bar again.

And it *was* funny, if you thought about it. We'd been handed one of mankind's age-old dreams . . . and here we were, stumbling around like Keystone Cops, chasing our miracle like Chaplin chasing his hat. And furthermore, being beaten, in our own house, at our own game: merriment.

For there was no denying that the cluricaune was having a better time in our bar than we were. We were accustomed to thinking of ourselves as a jolly crew—and he made us look like Baptists. He had outsung, outdanced, outpunned, outdrunk, outraged and outfoxed the lot of us, from the moment we'd clapped him in irons and put him in our thrall—and we had reacted pretty much like a convention of narcotics officers confronted by Hunter Thompson.

By God, when was the last time *I* had been having such a good time I'd urinated into the umbrella stand? Was I getting *old*, for Chrissakes? So the little guy had a commanding voice. Didn't that describe Long-Drink after the eighth drink? Or for that matter, Eddie in the best of times? What did I care about the damned umbrella stand? For that matter, what the hell did I even *have* one for? Not one of us owned an umbrella: thanks to Mickey Finn, it was no longer possible for any of Callahan's regulars to get rained on. . . .

So he'd offered us three wishes. This was something to hate him for? Just because we were too dumb to meet their challenge?

The general laughter gained strength; we howled until the tears came, and beyond. I hadn't laughed that hard since . . .

. . . Since I'd been in Callahan's Place.

The cluricaune whooped along with us. And not at us. The difference was clear.

"Oh Lord," I said when I could form words, "it's almost worth losing my whole stock, to have had a laugh like that. No, it *is* worth it. Ah Naggeneen, you slippery bugger, I'd have pissed meself if you hadn't siphoned me kidneys."

He wiped his own streaming eyes. "Faith, I do like a lad who can laugh at himself. Yer a fair jolly dog, Mr. Publican, damned if you ain't, and I take off me cap to ye!" He did so, with a grand tipsy flourish. "And the same for yer company—champion laughers, the lot of yez. I haven't had me a giggle like that since the reign o' Queen Dick!"

"The *what?*" Fast Eddie asked sotto voce.

"It's Irish for 'never,' Eddie," the Duck explained. I was startled. There was no sneer in his voice, no rude parody of patience. He just answered Eddie's question.

Doc Webster was the first to achieve full sobriety. "Well, Jacob," he said, "it seems to me our problem has sort of solved itself, wouldn't you say? I mean, I hate to break up this happy gathering; that belly laugh *was* worth a lot, and I'm grateful for it, but unless we want it to be the proverbial Last Laugh here, there's only one choice for Number Three. Right?"

"What's the hurry?" Shorty Steinitz muttered.

"I think we just proved kind of conclusively that the longer we put it off, the more trouble we're likely to get in," the Doc said. "Like Jake said before, like Noah said, think of a ticking bomb. Suppose Tanya had said . . . no, see, I'm doing it *again*. Fun is fun, but it's time to bottle it up and go."

I turned to Callahan. "What about you, Mike?"

"What about me?"

"Don't you . . . uh . . . need a ride home?"

That got a feeble rooba. Probably most people had the same quick flash I did: *lose the cluricaune, and then keep Mike Callahan here with us forever—*

—a prisoner of fairy magic. Right!

But Mike was shaking his head. "Like the Doc reminded you, Jake: I don't use a time machine to get around. I don't need any special equipment to get back home. I'll leave when I'm ready. The ball's in your court. The Doc is right: whatever you're fixing to do, t'were best done pronto. Looked at a certain way, people are essentially wish-generators, with no off-switch, and they're dangerous when armed. We can't help brimming with wishes, and most of them would kill us or worse if they ever came true. Sooner or later, somebody here's going to start subvocalizing what they're thinking."

In the midst of everything I became

aware of the fact that the Duck was staring at me with great intensity. Even more than everyone else present, he hung on my next words for some reason. I took a deep breath—

"Hold it!" Doc Webster commanded. "Before you take any irrevocable steps, there's something I've got to do."

I took a deep breath and let it out. "Swing," I said.

He waddled over to where the cluricaune sat cross-legged on nothing. The wizened little fairy regarded him without fear but with respectful attention.

The Doc planted his feet, threw his arms wide, rolled his eyes toward the ceiling and opened his mouth. As he sang, *"When . . . a . . ."* dragging it out theatrically like a ham baritone, people began to smile in sudden understanding, and the cluricaune's eyes sparkled merrily.

"—Canadian shows you his mother, he goes:

"Dat's my mawr, eh?"

The cluricaune roared. "A new one, bedad, and I thought I knew all of 'em—good on ye, mister!" Those of us who had gotten enough strength back laughed with him, and clapped our hands, and banged our empty steins on the bar and tables. Doc Webster had upheld the honor of the house.

The Doc inclined his head with massive dignity, and stepped back.

Tanya stepped forward. She cleared her throat. The cluricaune widened his eyes. And Tanya sang:

"With the high price of feed, it's for farmers in need

"That some mow hay. . . ."

More laughter and applause, this time with an element of groan in it, true, but still a good hand, from human and cluricaune alike.

I threw caution to the winds and came around my bar. The cluricaune whooped even louder when he saw me coming. "Yet *another?*" he cried. "Ah, ye're thunderin' geniuses!" Off to my right, Eddie gave me an intro chord on his piano.

"My new ray-gun here tries to put out both your eyes:

"It's a Moe-Ray. . . ."

Apparently his knowledge of American cinema ranged from *Kane* all the way down to the Three Stooges: he laughed so hard he lost his pipe. The applause I got sounded, to my totally unbiased ear, almost equal to what the Doc had drawn, but not so much more than Tanya's that I had to feel embarrassed. I bowed slightly to all, and went back around the bar to pronounce sentence.

And the Duck—of all people—left his chair for the first time that night, and approached the cluricaune.

"Faith, there *can't* be another," the little old man gasped.

Trying as hard as possible to appear bored, the Duck sang—in an unexpectedly magnificent, operatic tenor:

"If King Kong *has gone flat, rent the flick* Vampire Bat*:*

"That's some more Wray. . . ."

In the explosion of mirth that ensued, the cluricaune's teeth left his head and began caromming around the room like a runaway hedge-clipper, still laughing.

A long, breathless time later, he

drew himself unsteadily to his feet and held out his hands. His teeth and pipe returned to him, and docked without assistance. He spun in midair to face me, bowed so grandly he lost the cap, and caught it as it went by his feet.

"I take off me lid to yez, woman an' man," he said. "Ye've taken me best and ye've given it back to me. This is a house I'll be sorry to leave—but I guess you'll be wantin' me off o' yer premises. Hoo, an' can't say I blame yez atall: I've a terrible case o' the ol' barrel fever, I know it; it's part of me nature and cannot be helped. I'd drink every night nearly twice what I've guzzled tonight if I stayed. So let's have it over with: wish your third wish, an' I'll be on my way, leavin' thanks for the laughter you gave me today."

I looked at Mike Callahan. He looked back at me. In his face I saw his daughter Mary's face, only a wish away from Mary's Place . . .

. . . And for a moment, it seemed to me I could hear her husband Mickey's voice, crying in anguish on the night he'd first come to Earth, saying, *"I did not know that you had love!"*

I turned to the cluricaune. And in that moment I became mature enough to accept the help of magic in solving my problem.

"Nobody here wants you gone, Naggeneen," I said. "I just wish to God that you'd pay for your drinks like a gentleman—"

Mike waved at me frantically, mimed playing with a yo-yo.

Oh Christ, that was close! "—without, let me add, ever using your *Sprè na Skillenagh;* I want honest money."

I thought for a moment he was going to erupt in a towering rage. Instead, he began to laugh and laugh and laugh. If we could laugh at ourselves, his pride would not let him do less. "Done," he choked amid his guffaws. "Ye've quaggled me proper—first time it's happened in two hundred years!"

The cash register went *chung* behind me, and its drawer opened up and began spilling gold coins on my floor.

Pandemonium broke out.

PART FOUR: THE END OF THE PAINBOW

"What de hell kind o' spray was dat you said, Jake?" Eddie called, when the tumult began to die down.

"The *Sprè na Skillenagh,*" I repeated. "The 'shilling fortune,' is the English of it. A magic shilling, that always returns to a cluricaune's purse the moment you take your eyes off it, like there was a rubber band on it. He keeps it for the suckers. But cluricaunes *also* always know the location of buried gold, real gold, in large quantities."

Rooba.

"Jake?" Doc Webster said. "Maybe I'm missing something, but what good is all the gold in the world to us if we can't get a drink?"

"But we *can,* Doc," I said. "You just heard Naggeneen here state a maximum capacity."

He blinked. "Huh. That's so. But—"

"What none of you understand," I said, "is that the thirsty little feller is going to be the *saving* of this place."

Rooba rooba.

"What do you mean, Jake?"

"Do you remember the state I got myself into, getting this place ready to open, Doc?"

"Well . . . yeah."

"Now, you know me, Doc. Look around this place. Is there anything you see here that could have caused me that much grief?"

"Well, no, not really, now that you mention it. I *did* wonder what you were sweating so hard."

"I was sweating how to pay for this place," I said. "Remember how I said last night I was tripling the price of a drink, and everybody carefully didn't flinch? Fifty cents higher and some of you *would* have flinched, and rightly too, the amount of sauce we go through. I've been running around like a rat in my skull, working arithmetic over and over. I've sunk every cent of my savings in this, and so have you all, and there's no way in hell it can pay for itself." I turned to Mike. "I never appreciated just what a miracle-worker you are, Michael, until I costed it out for the eighty-fifth time."

He smiled. "I had certain advantages not available to you, son."

"I know that now. I think I knew it then: I just never thought about it. But even you might not believe what they're getting for glasses nowadays."

"Yeah, there's a big sand shortage. Still, bars do stay open, somehow."

I shrugged. "Half of 'em are probably laundering cash for the syndicate. All I can tell you is, for months I have juggled the figures—and the only way I could see of keeping this place open past six months was to triple our clientele. Which would destroy the place as effectively as a sheriff's padlock on the door. Certainly the getting telepathic part."

"Jesus, Jake," Long-Drink said accusingly, "you never told us—"

"And what if I had?" I asked him. "What could any of you have done? You've already all given 'til it hurts, Drink. Was I supposed to never have opened? Or soured the six months it looked like we were gonna have, by telling everybody there was a doomsday clock ticking? How did I know?—maybe we could all manage to *get* telepathic in six months, and clean up on Wall Street or something."

I flung my arms out expansively and grinned.

"Oh Jesus, it was tearing me up inside—but I'm free, by God, as of tonight! You heard what the Naggeneen said: he can drink the place dry twice a night: *he's just tripled our clientele*—without clumsying up the place with a mob of uncouth strangers. Doc, *we're covered!*"

A rafter-ringing cheer went up. Folks took the cluricaune gently in hand, and together they hoisted him up to their shoulders, and tossed him exuberantly up to those rafters; he laughed like a child and let gravity have him, fell back to be tossed up again, and again. Callahan grinned like a bandit and gave me his hand. I shook it contentedly.

I had not taken unfair profit from fairy magic. I had not plundered gold I had not earned, had not used a Spré na Skillenagh to pay my distributors, nor any other sort of cheat with a karmic backlash. I'd simply taken on one . . . er . . . jolly green client, with the thirst of a hundred men. A lonely great-grandson of Bacchus who would probably end up greying my hair, and classing my joint up considerably.

"Thanks for that footnote; that saved us," I told Callahan.

"You're welcome," he said with a wink of his eye.

I reached under the bar, took out a cylinder made of aluminum, twisted the end off, and dumped out what looked and what smelled like a coprolite. Callahan stared and then started to smile. "That isn't—"

"Be damned if it isn't: it's one of your miserable rotten cigars. I stepped on it as I was leaving, that night in the woods. It was radioactive, the first year or so, but I handled it carefully. Sort of a souvenir of you . . . to help me remember the kind of a stinker you were."

He stuck the thing into his grin, and set it alight with the tip of his thumb. As always, the thing smelled a *little* bit better on fire. When the first puff diffused throughout the room, all the cheering and laughter redoubled anew, as that hideous scent we remembered of old worked its magic on all of our subconscious minds.

"Does it make an appreciable difference," I asked, "the thing being seven years stale?"

"Oh, it does," he assured me. "It's just getting ripe."

"Naggeneen," I called out, "I no longer compel you, but maybe between us we might make a bargain as equals and friends with a terrible thirst."

He paused in midair at the top of a leap. "Speak on, for ye interest me strangely," he said.

"Have you had enough spirit to take off the *edge* of your thirst for the evening, at least?"

"I might have," he said.

"There's a case of Black Bush sitting out in the truck, and a room full of sufferers long out of luck. It's a reasonable man I believe that you are—if I send for that case, will it get to my bar?" I pointed to the special Bushmill's backup-shelf beside The Fount, about as long as the cluricaune was tall. "You can have all the bottles that fit on that shelf, but leave all the rest for my friends and myself."

Again, maybe rhyming it helped. "It's a bargain," he shouted, and people applauded until they were hoarse.

About a hundred Irish coffees later, the supply ran out again, and I was finally able to take a breather. I took my own mug of God's Blessing, feeling that I had earned it, and looked for someone to talk with. One large group was gathered around Mike, over by the fireplace, all talking and listening and laughing at once. Another large group huddled around the cluricaune, listening to him bullshit. A third group was dancing gaily to Eddie's piano, smiling fiercely with tears running down their cheeks.

And down at the end of the bar, watching it all in the flickering firelight . . . the Duck.

I wandered over.

"I could pretend to be polishing

the bartop," I said softly.

He spun round in his chair so fast it was hard not to flinch. But when he was facing me, his expression was not angry, but . . .

Well, I didn't know what it was. All that hair on his face didn't leave a lot of room for expression to express itself. All I could say for sure was that the permanent sneer I'd thought the natural shape of his face was gone now.

"Mister Stonebender," he said to me, in an oddly formal tone, "I liked what you did just now. You and your friends. If a walking thirst is welcome here, would it be all right if I hung around here and tried to get telepathic with you people?"

I was touched, and moved by how much effort it had cost him to ask. "All right?" I repeated. "I think it would be world-class, Mr. Shea."

He gave me his hand, and I shook it solemnly.

A corner of his mouth twitched. "Kind of hard to square getting telepathic with that house custom of yours, coldcocking anybody that asks a snoopy question. Or is that just with newcomers?"

I shook my head. "That's the right way to *get* telepathic: walking on eggshells, with the awareness that a mistake could put a knot on your own skull. It's *dark* in there. Look, how about if I try to read just what's right up on the *top* of your mind, now? Just the headlines."

He scratched his hairy head and thought about it. "The ones above the fold."

"Sure. Hey, Mike! You got a minute?"

Callahan excused himself from the group and came over. Brian Boru, the cluricaune had called him. Hell, for all I know, maybe Mike *had* been King of Ireland at the turning of the last Millennium—and Cú Chullain a millennium before that, too, for that matter. I saw him deal with Hitler as an equal, once. All I can tell you is, barefoot and barechested, wearing another man's trousers and trailing clouds of toxic waste, he strode through my place like a king. He slid gracefully into a tall chair next to the Duck, and saluted him with a half-empty glass of the Black Bush.

The Duck nodded back at him and turned to me. "Not bad, pal," he said judiciously. "You don't miss a lot."

"Go on, ask him," I said.

He shrugged, and turned back to Callahan. "Mike, I'd—"

"You want to know," Callahan said, "some stuff about yourself. And what I meant by that dopey joke about your comeek."

The Duck raised an eyebrow. "You guys volley pretty good around here."

"I haven't even started," Mike said. "The Great Miasmo sees all, tells all. Tell me how close I come." He put his head back and recited softly. "You're special. Things go haywire around you. It's like you sweat practical jokes. The laws of probability don't apply to you. I heard people call you the Duck: that must be short for The Lucky Duck, right?"

"Go on," the Duck said tightly. "You're doing great."

"There isn't a mountain from one

end of Long Island to the other, so you must live in some kind of ruin."

The Duck nodded, frowning. "An abandoned mansion. I usually pick places like that. I don't bother anybody there—or get bothered—and if I need any food or water or electricity . . . well, I seem to get lucky. Go on."

"Your mother—"

"Yah?" the Duck said sharply.

"I mean no disrespect," Callahan said carefully, "in discussing your mother. If it helps any, my wife is a madam. But would I be correct in guessing that your mother is . . . of in-excessive stature, like yourself? And perhaps, also what some might consider . . . more hirsute than average, again like yourself?"

The Duck waved his hand, to show he took no offense. "Short as a fireplug, hairy as a—she taught me how to shave, OK?"

"And she always took you for wild rides on her back, when you were a kid."

"You must be readin' my mail," the Duck said.

"The only part I can't figure out," Callahan said, stroking his bristly chin, "is why you aren't wearing any red."

The Duck's eyes widened. "Ma has a fetish about that. She made me swear never to put on anything red as long as I lived . . . thinks it's the color of the Devil."

"Ah," Callahan said. "Much becomes clear to me now."

The Duck slowly regained his characteristic expression—bored scorn—and put it on like a raincoat. "Look, Sherlock Holmes," he said, "nobody likes being gaslighted more than me—I've been known to drive hundreds of miles to get jerked around by total strangers—but if you know what you know, then you know it's the *mystery of my goddamn life* you're screwing with here. String it out as long as you like—I'm not a killjoy—but when you finally get to the blow-off of this pitch, when you're ready to read my leaves or do my chart or whatever it is you're gonna do, would you wake me up?"

Mike was immediately apologetic. "I am sorry, Ernie. Sometimes I get too cute for the room. I'll tell you anything you want—and lead you if you can't find the right questions, OK?"

"What's a Fir Darrig?" the Duck asked.

The moment he said the term, I remembered how alarmed he had looked, the first time he'd heard me use it, in the course of explaining to the group about the Daoine Sidh. I had misunderstood the reason for his dismay, then. Because when *he* pronounced "Fir Darrig," now, I realized at once that I had already heard him say it once before.

When he had told me the name his mother had always called his absentee father. "Feared Eric," I'd heard him say, at the time.

"A Fir Darrig, often called the Red Man, is one of the Daoine Sidh," Callahan said promptly. "Like a cluricaune, he tends to attach himself to a house or locality, rather than to a family. Stands about three to four feet high on average, always dresses in red cap and coat, and has a remarkable voice, described as *ceileabhar na nèan*, the warbling of birds. They are the practical jokers of the Daoine Sidh. Mischievous jokes if they like you, mean-spirited ones if you offend them, really nasty ones if you threaten someone they love. They sort of exhale good and bad luck. Which can mean hell to pay for those around them."

The folks at Mary's Place are better than average at eavesdropping. People had been doing so for the last few minutes, and even I'd had to look sharp to catch them at it—but now one or two of them smothered a rooba.

The Duck glared at them . . . and then sighed. "Listen up, people," he said in a *ceileabhar na nèan*. Heads turned, with politely expectant expressions. "Callahan here has just told me that I'm the son of a Fir Darrig. One of those Deeny Shee jokers, like our friend Naggeneen. Apparently I'm one of the Gods of Practical Joking on my father's side."

There was a thoughtful pause.

"I buy dat," Eddie said.

"Yeah, that does explain a lot," Doc Webster said. "Good for you, Duck-o."

"Why, that's wonderful, Ernie," Merry Moore said. "It must be nice to have that cleared up, huh?"

"I should have suspected," the cluricaune whooped happily. "The first time I've ever been tricked into payin' for liquor, I should have suspected a Fir Darrig's hand. It's clever indeed that yer not wearin' red: it misled me entire. Good jape, Brother Duck, and I drink ta yer health!" He flung an empty Bushmill's bottle into the fireplace—several other receptacles followed it in—and led a round of applause.

"Congratulations, Duck," Long-Drink McGonnigle said respectfully. "There was a time in my youth when I'd have worshipped you."

"A lot of people have that reaction to me," the Duck said.

"Mike," I said, "when I first met Ernie, I found myself speaking Gaelic to him. Any idea what that was?"

He nodded. "He'd just asked if he could warm himself at your fire, right? And you'd said sure."

"Come to think of it, yeah."

"That was your blood coming through, Jake me boy, saving your Irish butt. Instinct, something your grandmother told you when you were little, something you read and forgot, I don't know. You said, *'Na dean fochmoid fàinn,'* or 'Do not mock us.' It's the only salutation that guarantees a Fir Darrig won't play any *harmful* pranks on your house."

"I wondered why I took such an instant liking to you, stringbean," the Duck told me.

He *had?* If that was true, I hoped I'd never see him suffer a fool.

"OK," he went on, "this is good, this is interesting, let's keep this up. So I'm a half-breed Fir Darrig. Practical jokes, riveting voice, sensitive nature, short and hairy, it all fits. Let me see if I can work this out: I can't *control* my practical jokes because I've only got half the genes for it, right? Wait! Do you suppose the *color* could have anything to do with it?

You said Fir Darrigs always wear red—could it be that if I were to . . . no, that's crazy. Ma never said a word about my screwball luck, never mentioned it, but I knew it drove her just as crazy as it did me. She'd never have prevented me from learning how to control it, and she's the one who made me swear never to wear red—"

"I'm afraid, son," Callahan said, "that you only have half the story."

The Duck stood very still and closed his eyes. He unclenched his hands a finger at a time and put them down at his sides. "Straighten me," he breathed, and opened his eyes. "'Cause I'm ready."

"Son, you're a pooka on your mother's side."

The Duck did not react in any visible way. Neither did anyone.

Then Doc Webster cleared his throat. "Excuse me. Mike?"

"Yeah, Doc?"

"Look, I decided awhile ago I was never gonna let anything blow my mind again. Hanging around you, it was kind of self-defense, you know? I've accepted everything from a talking dog to a cockroach from outer space to a cluricaune with the power to grant buggerin' wishes, and I haven't complained, have I?"

"No, Sam, you haven't," Callahan agreed.

"Irish fairies, flying saucers, JFK killed by Elvis, whatever: you put it down, I'll pick it up. I just want to be absolutely sure I've got it straight, that's all. So look me square in the eye, and tell me one more time, with a straight face: *the Duck's mom is a seven-foot-tall white rabbit named Harvey?*"

Mike almost smiled. "That movie was as faithful to Irish mythology as a scifi movie is to science. Pookas can manifest as a lot of different animals—goat, horse, bear, wolf but they're always *hairy*, not furry. They're short, not seven-footers, damn near as short as a Fir Darrig or a cluricaune. And they don't just sit around in a white vest, sipping a quiet drink with Jimmy Stewart. They are not especially pixilated or loveable. What they mostly do is scare the shit out of people—"

"—by taking them for wild rides on their back," the Duck said quietly. "Yes?"

"Yep. They mostly live in old ruins, or isolated mountains. They're lonely and quirky and generally considered dangerous."

"And once in a long while, one of them gets lonely and quirky enough to develop a hankering for miscegenation with something exotic. Like a Fir Darrig. And gives *him* a wild ride on her back. . . ."

"If one ever did," the cluricaune said, the compassion of the grandly drunk plain in his voice, "she'd be sure to be spendin' the rest of her days in regret and remorse, with contempt for herself and a black reputation. T'is a union Saint Patrick himself couldn't bless, and a recipe certain for very bad cess."

The Duck spoke to Callahan. "You're telling me that I'm the only person in North America who's *right* when he says, 'Everything screwedup in my life is my parents' fault!'?"

Mike took a deep breath. "In a word . . . yes."

The Duck closed his eyes and visibly calmed himself. "Ma and I will have to have a little talk," he said gently. He opened his eyes. "No wonder she didn't have any pictures of her parents. No, wait—Jesus Christ! *Ma's always kept a pair of goats. . . .*" He closed his eyes and controlled himself again. "They *acted* like my grandparents, of course, but all goats do that," he said in calm, reasonable tones. "I *thought* Ma spent a lot of time with them."

Rooba rooba . . .

He was quiet for a time, then, and the rest of us fell silent as well.

Well, what *could* you say? Something had to be said, that much was clear. But *what?* "I know how you feel . . .?" I racked my brains as the silence stretched out. Something sympathetic? Or was that the wrong tack with this thorny man? Something to try to break the tension? Something macho, stoic? Like what? I looked to Callahan. He shrugged helplessly back at me.

"I know how you feel," Fast Eddie said.

The Duck opened his eyes and blinked at him mildly.

"As for me," Eddie went on, "my fodda was a jackass, an' my mudda was a sow."

In spite of himself, the Duck grinned.

"My parents were both hemosexuals," self-effacing little Pyotr the vampire said truthfully, sipping his Mary's Bloody (Type A).

"I myself am the offspring of a turkey and a barracuda," Long-Drink McGonnigle said, and Doc Webster, who knows the Drink's parents well, went into quiet hysterics, his big belly shaking.

"I am ze son uff a bitch unt a sonofabitch," Ralph von Wau Wau offered. "Alzo, my anzestors were allegedly involfed vith sheep a great deal. Ve may haff relatifs in common, Duck."

The Duck began to chuckle softly.

"I'm the product of a swine and a bat, myself," Margie Shorter put in, bringing more laughter.

"Captain Ahab and the Great White Whale, here," Doc Webster said.

"I have it on good authority that both my parents were bear when they conceived me," Shorty Steinitz said, and became the focus of a shower of peanuts and crumpled napkins.

"I'm a Thorne on my mother's side," Tommy Janssen said. "That's what she always says, anyway—"

The Duck was giggling outright now.

"I don't know how to tell all of you this," Isham said, "but my grandfather on my father's side was a white man."

"Jesus, Ish, that's awful!" "Little touch of the lard brush, eh?" "It's not your fault, bro," and "Be *strong*, homey!" were among the comments heard amid the laughter.

"That's nothing," Marty Matthias called out. "My *mother* is a white man." Whoops. "Hey, listen," Marty's bride Dave said, "you should taste his spaghetti sauce." Louder whoops.

The Duck stopped laughing quite suddenly. He frowned ferociously, took in a very deep breath, and when he spoke I thought we had blown it, thought he was saying, "Bah!" The laughter faltered for a second . . . and then returned as we realized he was pulling our chain, was braying not, "Bah," but a goat's "Ba-a-a-a-a-a-a—"

He finished it with "—humbug!" just the same . . . and then threw an arm around Callahan and gave him a squeeze. Amid the applause, Margie Shorter slipped under his other arm. "So tell me, Ernie," she purred, "aside from having enough hair to get a decent grip on, exactly what other characteristics do you share with a goat?"

There were hoots. He blinked at her—Marge is a short woman; they were almost at eye-level—and pursed his lips judiciously, and said, "All I can tell you is . . . improbable things happen."

And she shivered deliciously and melted against him as the ovation began. I think only I heard what she murmured to him. "Here's looking at you . . . *kid.*"

He butted her with his head.

A little later, when the party was in progress once more, the Duck got a chance to finish his conversation with Callahan. Mike explained his original feeble joke about the Ernie Pooka Comeek (You do know about Lynda Barry's comic strip, don't you? If not, a rare privilege awaits you.), and the Duck forgave him for it.

"So if I understand this right, my . . . abilities are out of control because I didn't get raised properly. Dad wasn't there to teach me how to be a Fir Darrig, and Ma hated the sound of the word. So what do I do now? Is it like learning to talk, there's a window and then it closes, and it's too late? Or do I make a pilgrimage to Ireland and try to find a Fir Darrig who wants an adopted son so badly he doesn't care if the kid's retarded?"

Callahan put a fresh light to his cigar, then waved his thumbtip out. "I can't really say I have any answers for you, son. I know what I'd do in your shoes."

"What's that?"

"Stay right here and have a drink."

The Duck snorted and followed the advice.

"I'm serious," Callahan said. "Hang out with these folks. From what I understand, they have set themselves the goal of becoming mutually telepathic—and furthermore are sensible enough not to be attached to succeeding. That's smart behavior for anybody of any species or race. Furthermore, it calls for an unusual amount of luck—a job with your name on it. And I have a feeling that the doors in your head that you'll have to open to join with them are some of the very doors you need opened to get a handle on your talent. The very first thing necessary to anyone who's weird is a place where they don't give you a hard time just because you're weird."

The Duck looked around him. He slid forward on his chair, held out his half-full glass, and drop-kicked it. It caromed off his foot without tumbling or spilling, and disappeared into the crowd. There was a small, traveling commotion, a startled *gulp*, a small crash and assorted ancillary noises, and the wave of commotion came back through the crowd again. The glass appeared in the air, upright, incoming, and the Duck caught it. It was now half full of peanuts. "Thanks, Duck," Stan called politely.

"I *have* been looking for a place like this for a godawful long time," the Duck admitted in a very soft voice, and ate a peanut.

Suddenly Long-Drink McGonnigle was upon us, bellowing and whooping in acute glee. "Jake! Mike! The penny just dropped!"

"That was my glass," the Duck said.

"No, no, I mean something just occurred to me—no, I mean, something just *failed* to occur to me—hasn't for hours, in fact, and anybody here will tell you, that's just not normal, certainly not for me; I mean, not getting rained on is fine, but *this* is fantastic!"

"I'm certainly glad you've cleared that up, Drink," the Duck said. "At first I thought you were raving."

"Don't you get it? Don't all of you get it?" He turned around and addressed the room, at the top of his lungs: "WE ARE THE MOST FORTUNATE HUMANS ON EARTH!"

From his piano, Fast Eddie said quietly, "Hell, we know dat, Phil."

Long-Drink was practically tearing his hair. "Jesus, don't any of you turkeys see it? We've found the End Of The Rainbow—only there isn't any gold in the pot, that's the glorious part!" He spun on me. "Jake, you genius, you're a genius: no serious drinker who walks in here will ever leave again!" He spun back to the crowd, apoplectic with joy. "You fools, can't you see it? It's right under your belt-buckles!"

People stared.

Long-Drink turned to Callahan. "Mike: in your best professional estimation—excluding our esteemed friend, Naggeneen—how much sauce would you say we've put away since you arrived?"

Callahan looked thoughtful. "I would say . . ." He looked around, gauged faces, ". . . about three quarters of a shitload."

Long-Drink nodded and turned back to the crowd. "Right. Now tell me, you rummies: in all that time *has that door over there swung open once?*" We all followed his pointing finger . . .

. . . to the bathroom door. (A single door, marked "Folks.")

"Jesus Christ," Eddie breathed, and hit a discord.

"Well," I said, "that *would* be one side-effect of having a cluricaune around the joint."

Naggeneen whooped drunkenly. "The pleasure's all mine! Sure, a waste is a terrible thing to mind, is it not?"

"That settles it," the Duck said. "I'm staying." ■

IN TIMES TO COME

Next month's Bob Eggleton cover is one of those that stands on its own, but inside the issue you'll find plenty of good stories, including three very different novelettes. Arlan Andrews leads off with "Hail, Columbia!" an insider's look at our nation's capital in the not too distant future, yet far more different from today's version than even *its* insiders realize. Gregory Bennett's "Swan Song" is a suspenseful adventure in space wherein a lone man has to practice what he's always thought he believed—or else. Grey Rollins' "Burial Detail" is set in our past—possibly even our *real* past—and raises disquieting questions about the human propensity for reacting to symbols rather than their meanings.

Our short stories, no less varied and enjoyable, come from F. Alexander Brejcha, Jayge Carr, and Mark Rich. And Mark S. Lesney provides the fact article, "Old MacDonald Had a Pharm: Gene Farming and the Biopharmaceutical Revolution." Human farmers have long cultivated plants and animals as sources of food, clothing, and building materials, but genetic engineering is already broadening the range of possibilities dramatically.

BRASS TACKS

Dear Mr. Schmidt;

In reference to your editorial "Home Rule," November 1992.

I must acknowledge one good thing about your telecongressperson scheme. It would make the lobbyists have to travel to bribe our representatives, as electronic funds transfers might be traceable.

However, you seem to have fallen into the same trap as our Congressmen, misunderstanding the function of Congress. When our "founding fathers" wrote the Constitution, they set it up that way for good reasons. They knew that whenever a central government exists, whether a feudal oligarchy or a republic, there is a tendency to sell out to special interests: landowners and the Church then; big corporations or unions or whatever now.

A particularly egregious example of this is our present price fixing for sugar. We all pay far more than the going world market price for sugar, simply to buy the votes of about 200 sugar beet growers and a few Hawaiian planters. Our representatives get their contributions (bribes), and none of us sugar eaters is so inconvenienced that it is worth campaigning against the rascals. On the other hand, direct democracy tends to favor the majority, at the expense of the minority—let's tax the industrious few to pay the mediocre many. (Amendment XVI was intended to do just that; the income tax would supposedly tax only the richest 1% of the voters.) The framers of the Constitution tried to introduce checks and balances.

1. The power of the Congress would be limited, with taxation based on population and all powers not necessary to the central government reserved for the States or "the People." Why should your telecongressperson stay home to experience the local schools and sewage systems when *schools and sewers are none of Congress' business?* They hoped to avoid pork-barrel politics; you seem to encourage it. (Early on, a bill to grant a pension was defeated, because it might set a precedent. The federal government had no business making grants to individuals.)

2. The House of Representatives would represent the people, a good cross section of the country, and would initiate spending bills and taxation. By implication, the widely representative body would have to benefit the general good of the country, by consensus, and a majority would not vote to benefit individual munici-

pal sewer systems. (Of course, the lawyers figured a way around that, with seniority, vote swapping, etc.)

3. The Senate would be a body of wise elder statesmen, selected by state legislatures, to veto the mob in the House if they did something insane, like appropriating more money than they would receive in taxes.

Now, as we all acknowledge, we have the best Congress which money can buy, career mendicants who sell their votes (the Keating Five called it "serving their constituents") and who can see no further than the next election.

Let me suggest my modest solution: *eliminate the elections.*

First, repeal Amendment XVII, which provided for the direct election of senators. If they don't have to buy TV ads, they can be held to more ethical standards with regard to accepting money from special interests. Let them be selected for wisdom, not charisma or skill in fleecing the other 49 states to favor their own.

Second, select representatives by lottery; draft them for one term, during which they would be provided nice housing, etc. in DC, and send them home with a lapel pin which says, "I served my country." They should be discouraged from running home to their constituents; they should act for the good of the country. (Certain Renaissance republics actually sequestered the representatives, to prevent bribery and lobbying.) If the base for the lottery were broad enough, say all valid drivers' license holders or all who had voted in the last presidential election, then the House would be truly representative, with women, racial minorities, gays, Flat-Earthers, *Analog* readers, etc. represented more or less in proportion to their numbers. That is surely better than "representatives" who are mostly white male lawyers who couldn't make an honest living. (If Chicago gets a voter drafted who has been dead for decades, so what? There's a certain justice to it.)

Likely both the honesty and the intelligence of the House would be increased, on the average. Since the representatives wouldn't be running for re-election, they would less likely fall prey to lobbyists and pork-barrelling, and they could spend all their time making informed decisions (versus bought decisions or knee-jerk reactions to polls).

ERIK BUCK

Dayton, OH

I agree that schools and sewers are primarily local concerns, but they and many other aspects of local life are at least indirectly influenced by federal policies. Yes, we'd need safeguards against pork-barrels, but I can't buy the claim that it's better for congressfolk to be ignorant than knowledgeable about life in their districts.

Dear Sir:

I thought I should write in reply to your editorial, "Home Rule," in the Nov 1992 issue of *Analog*. In general, I have to agree with your premise that our elected officials could perform their duties electronically from their home states. Recent articles in such journals as *Communications of* *the ACM* and *Computer* indicate that there may be some technical issues regarding security and encryption which may need to be resolved to really make such a system workable, but I have no doubt that they can be resolved if we want them to be.

However, I think your editorial did not go far enough. The same technology that would allow our elected representatives to work from home also makes them unnecessary. We could use this technology to implement a direct democracy; true government of the people, by the people, for the people. It seems unlikely that such a system could be more expensive, less efficient, or more easily influenced by special-interest groups than the one we currently enjoy. Then we would really have home rule.

Since I cannot even submit this letter to you electronically, I doubt that we will see this happening soon.

JEFFREY R. CARTER

Sterling, VA

These things change faster than almost anybody realizes; we could see it sooner than you think. But is it really a good idea? Too fast a response time can lead to snap judgments that make very poor long term sense. And how many people would really want to devote enough of their lives to the detailed business of government to do it well? Recommended reading: "Pandora's Printout," by Joseph P. Martino, in our April 1983 issue.

Dear Dr. Schmidt,

I am writing in regard to the story "P.C. Software," by G. David Nordley, in the November issue of your magazine. I am currently a student at a large public university where Politically Correct fascism is instituted by the school itself. Although the official line is in favor of "diversity," I will be punished if I deviate from acceptable speech. The rules booklet given to me at the beginning of the semester lays forth a prohibition on "ethnic, sexist, or racial slurs" or the display of items that "are racist or sexist in nature." They leave all of the terms undefined.

This sort of regulation has two main problems. Firstly, the vagueness of the language makes enforcement inconsistent in the extreme. I completely understand the need for a rule that protects people from direct harassment, but I do not see the need for the inclusion of the references to racism and sexism. This just persecutes those of us who aren't racists or sexists in any way, but have chosen not to abandon our senses of humor and a large portion of our vocabularies. Like the editor in the story, I am afraid to tell jokes in public for fear of punishment by the PC administration. I cannot think of a single joke at this time that stays within the bounds of Political Correctness and remains amusing.

Secondly, the institution of rules against certain words, and by extension, certain thoughts, considered "racist" or "sexist" is a direct contradiction of their professed love of "diversity." They appear to be in favor of diversity of skin color, but not of thought. Me, I care a hell of a lot about diverse thought, but I could care less about skin color. And I always thought that "color blindness" was a virtue. . . .

I sincerely hope that those in charge of the university read the story, and perhaps think about eliminating PC Fascism from the school's official policy. Until then, I guess Big Brother is watching.

NICHOLAS J. CONDON

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Dear Dr. Schmidt:

About twenty years ago, when "creativity" was the educational buzzword, Isaac Asimov observed that the best single indicator of creativity he'd seen was an interest in science fiction. In that spirit, I've just entered a gift subscription to *Analog* for my local library which, like most town libraries in New England, doubles as the school library.

Why not encourage other *Analog* readers to do likewise? There's precious little to suggest to kids today that science can be fascinating, and *Analog*'s unique combination of adventure and rational thought could be a useful corrective. As it is, the only mass-media science they get is "Nova" reruns or PBS "environmental" programs where science and technology are usually prefaced with "unfortunately. . . ."

JOHN K. LUNDE

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Dear Stan:

I allow myself the familiar address because I have been a reader of *Astounding/Analog* since the late thirties. Formality between myself and such an old friend would seem stilted and affected, and, as editor, you assume the persona of *Astounding/Analog* for me. You may note that my subscription is paid up through July '97. God willing, it will continue for a number of years thereafter.

All of this causes my interest in the magazine to verge on that of an intellectual symbiont, integrating the ideas and examining the concepts presented therein like a student towards a respected professor. Think about a relationship that has continued for over 50 years in my life of 68; there has surely been significant intellectual transfer! So I feel justified in presenting a bit of negative feedback.

One of the recent trends in story content is the overthrow of many artificial, Victorian taboos. For example, acknowledgement that characters will have to cater to body needs, from defecation to washing. And that humans have a sex drive that will significantly affect their behavior and motivations—which is damned entertaining to read about!

Remembering the artificiality of narratives in earlier stories because these human needs were ignored, I've welcomed the change. After all, it is understandable why public question and answer opportunities with astronauts so frequently get around to the question of how they take care of bodily needs, although only Harry Stine has, to my knowledge, dealt with the question of sex in space and whether it has already happened (The Three-Dolphin Club, I believe it was called).

Lately, however, and in fact in the last few issues, another new trend has surfaced; one that I do not welcome; one that causes extreme discomfort in this reader every time I stumble over it in a story. And I've been stumbling over it with disturbing frequency.

My problem has to do with the difference between blasphemy and obscenity. Obscenity can probably be defined as existing in the perception of the reader, with some, for example, accepting graphic descriptions of mayhem (à la Stephen King) as entertaining and necessary to the story line, and others abjuring such works as mind-contaminating.

Blasphemy, however, is blasphemy. My dictionary defines it as "to speak of (God or something sacred) in an irreverent or impious manner."

In the spirit of intellectual liberation of science fiction writing that I have discussed above, one can expect the occasional use of a reference to God as an expletive as depicting the behavior of real people. Nor do I hold with those who would censor writing or any other art form. My hope is that the limits on the use of obscenities and blasphemies will be set not by edict but by the general exercise of good taste. Unfortunately, good taste has become a "threatened species" in our day, if it is defined as emphasis on the finer human attributes and the avoidance of senseless crudities. Especially here in the U.S.A., the falling of barriers to free expression have engendered an explosive exploitation by the media of filthy human behavior in all its aspects. It is perhaps an understandable phase, akin to that of a pubescent human who just discovered the libido and, lacking any restraints, engages in an orgy of licentiousness.

However, it pains me to see such a trend building in *Analog*.

I found *The Modular Man* to be among the best and probably most memorable stories I have ever read in *Analog/Astounding*. Its theme is timely, poses what may all too soon be real societal issues of grave importance and treats the material (as well as I can discern) with consummate technical perfection. But there in the April '92 issue Roger MacBride Allen threw a turd in the intellectual punch bowl by escalating from (and it is painful for me to write it) from "Holy Jesus Christ" on p. 160 to "Holy goddamn Jesus Christ" on the next page. I fail to see the need for such blasphemies in an otherwise intellectually excellent and challenging story. *While defending your right to use such language, I decry the author's poor judgement and bad taste in availing himself of that right.*

Nor is this an isolated example. In the May issue, in his otherwise good allegory on the presidential elections, Doug Larsen exercises the same privilege by several references to God and one to Jesus Christ, all in a blasphemous manner.

Also in the same issue, Pete D. Manison, in his short story "The Golden Life" has his character state that he "no longer believed in a God that would inflict such suffering. This could not be. God would not be so unfair." Now this is not blasphemy, but a commonly heard argument against the existence of God by asserting the evils perpetrated by mankind to be acts of God. It would certainly feed the paranoid perception that *Analog* is becoming anti-Christian.

Please, in what are perforce the waning years of my enjoyment of *Analog,* do not exercise this new freedom of expression by plumbing the depths of your license. Surely this is a transitory period in our society. Perhaps *Analog,* under your leadership, can help establish the golden mean between Victorian repression and licentious extremism.

WILLIAM E. HAYNES

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9-12 July

LIBERTYCON 7 (Tennessee area SF conference) at Comfort Hotel River Centre, Chattanooga, Tenn. Guests of Honor—Michael McCollum and John Maddox Roberts; Artist Guest of Honor—Mark Fults; MC—Bob Tucker. Registration—$25 until 15 June, $35 thereafter. Attendance limited to 450. Info: Libertycon 7, Box 695, Hixson TN 37343.

16-18 July

DRAGON*CON (Southern SF conference) at Atlanta Hilton and Towers, Atlanta, Ga. Registration—$35 until 15 June, $40 at the door. Info: Dragon*Con/ACE '93, Box 47696, Atlanta GA 30362. (404) 925-2813

16-18 July

CONFLUENCE '93 (western Pennsylvania SF conference) at Palace Inn, Monroeville, Penna. Guests of Honor—John DeChancie, William Tenn, Ted Reynolds, Robin Wood. Registration—$20 until 1 July, $25 thereafter (checks payable to Parsec). Info: Confluence, Box 3681, Pittsburgh PA 15230-3681.

2-6 September

CONFRANCISCO (51st World Science Fiction Convention) at Parc 55, ANA Hotels, Moskone Centre, San Francisco, Calif. Guest of Honor—Larry Niven; Artist Guest of Honor—Alicia Austin; Fan Guests of Honor—Tom Digby and jan howard finder; MC—Guy Gavriel Kay. Registration—$125 adult/$30 child until 16 July 1993. Supporting—$25. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: 712 Bancroft Rd, #1993, Walnut Creek CA 94598. (510) 945-1993. CompuServe 72377,3623.

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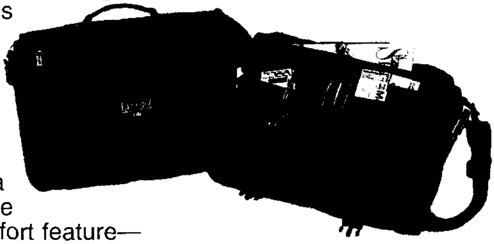

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